

## MAJOR ECONOMIC FORCES AFFECTING AGRICULTURE

### WITH PARTICULAR REFERENCE TO CALIFORNIA<sup>1</sup>

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#### 1. INTRODUCTION

IT IS COMMONLY EMPHASIZED that the economic position of California agriculture is subject to special factors that do not operate, or operate to a much smaller extent, in other parts of the nation. Special conditions in climate, soils, topography, economic location, and history, and, accordingly, in types of products, yields, prices, and organization, put farming in California in a class by itself if compared with that in other states. Still, for California agriculture as a whole, as well as for its individual branches, changes in economic position are influenced greatly by major economic forces affecting farmers regardless of type of product and location. This study is concerned with such forces.

In order to explain the nature and significance of major economic forces, it appears best to analyze their operation in the past. On such a basis, obviously, no hard-and-fast forecasts about the future can be made. One may attempt, however, to help the reader recognize the direction and strength of present tendencies and appraise public economic policies designed to cope with them.

For this attempt it is useful to start the analysis before the first world war. Statistical data for individual states are rather unsatisfactory in volume and reliability before 1910. On the other hand, economic tendencies visible after World War II have important characteristics in common with those that were created through World War I. Although it cannot be expected that history will repeat itself, it is highly instructive to observe how the economic forces in which we are interested have operated during and after a major war.

In the historical analysis, conditions in California agriculture will be compared, as far as available data permit, with conditions in the United States excluding California. One objective of this study is to ascertain how far and in what way the economic position of California farming is related to that of

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other agricultural regions of the country, to the nonagricultural national economy, and to foreign trade.

Changes in the economic position of California farmers will be studied in three stages: (1) with respect to gross income, (2) with respect to production expenses and charges, and (3) in relation to other parts of the national economy. This procedure enables separate analysis of the most important economic forces, and makes the best use of available statistical data. Extensive use will be made of graphs. By way of illustration, these graphs will help in understanding the often rather complex and controversial relations which will be discussed. The statistical data on which graphs and tabulations are based are explained on pages 71 to 76.

## 2. TREND AND FLUCTUATIONS OF CASH FARM INCOME SINCE 1910

*Summary.* A comparison of cash farm income in California with that in the rest of the United States shows that: (1) Major economic fluctuations affect cash income of farmers in California in about the same way as that of farmers in the rest of the nation. (2) The effects are great in all major lines of production. (3) The effects are more important for aggregate changes of cash farm income than long-time growth (trend) and year-to-year variations in yields, acreage, and livestock production.

**Changes of Cash Farm Income.** Gross farm income is composed of cash income from farm marketings, of the value of home-consumed products, and of government payments (conservation payments, parity payments, production subsidies, and so on). The first source is by far the most important one; during the decade 1935 to 1944, when government payments began to play a role in American agriculture for the first time, 96.4 per cent of the gross income of California agriculture came from farm marketings, and only 1.8 per cent each from home consumption and from government payments. Moreover, the nature of major economic forces can most effectively be explained by confining the analysis to cash farm income. The quantity of home consumption is statistically unreliable, and its value is largely determined by the same forces that affect the value of farm marketings. Our discussion, therefore, must focus on cash farm income.

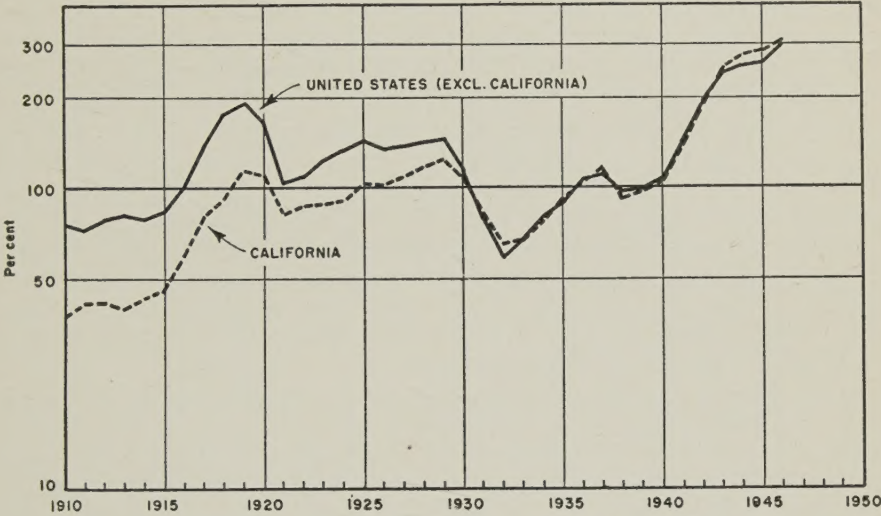
Changes in cash farm income from all sources (crops and livestock) in California and in the United States excluding California are graphically presented in figure 1. At one glance two observations come to mind in studying the upper figure (fig. 1, A): First, there is an upward long-time trend of both series. This trend is stronger for California than for the United States excluding California. Second, there are fluctuations which are closely similar in amplitude and direction for California and for the United States excluding California.

A third fact cannot be observed from the indices: The average cash income per person of the farm population is considerably higher for California than for the United States excluding California. During the period 1939-1944, for example, average cash farm income per person per year was \$1,844 in Cali-

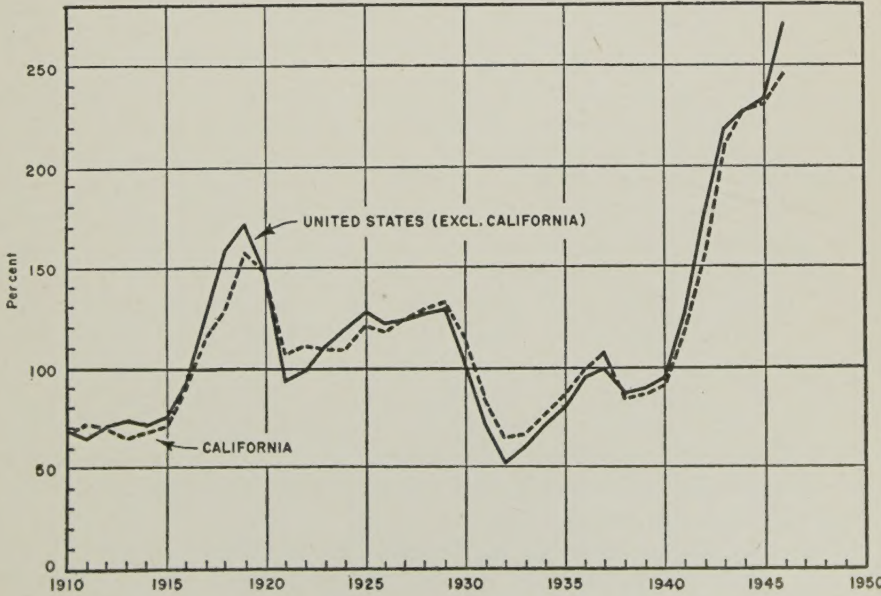


FIG. I. TOTAL CASH FARM INCOME FOR CALIFORNIA  
AND THE UNITED STATES EXCLUDING CALIFORNIA

A, Total Cash Farm Income (1935 - 1939 = 100)



B, Total Cash Farm Income (Trend = 100)



fornia and only \$464 in the United States excluding California. The most important factors which account for this difference in income levels may be considered with the factors that cause trend and fluctuations. Farmers and policy makers are less concerned with past and present levels of income than with the forces that may bring about changes of income in the future. Attention, therefore, must be focused on trend and fluctuations of cash farm income. First, we will consider trend.

**Trend of Total Cash Farm Income.** The difference between California and the United States excluding California in the rate of long-time increase of cash farm income was especially noticeable from 1910 to 1930, almost disappeared between 1930 and 1940, and showed a tendency to reassert itself thereafter (fig. 1, *A*). This difference and its changes over time correspond to differences in the growth rate of the farm population and farm employment (fig. 2). Until about 1930, California shows the signs of an expanding agriculture in a young country, whereas the United States excluding California exhibits the behavior of agriculture in a more mature industrial economy, that is, stationary or slowly declining farm population and decreasing agricultural employment. After 1930, California begins to follow the pattern which prevailed for some time in the United States excluding California.

It may be noted that the long-time increases and decreases in the farm population are modified by cyclical movements (fig. 2). These are the effects of rural-urban and urban-rural migrations during prosperity and depression as well as of migration to California for other reasons—especially because of drought outside of California in the middle of the 1930's and because of the boom in Pacific Coast industries during World War II. California farm population is more influenced by these migrations than the farm population of the United States excluding California. The ratio of farm population in California to that in the United States excluding California exhibits, therefore, fluctuations around a trend which, in itself, corresponds to the trend in ratios of farm employment and cash income (fig. 2, *B*).

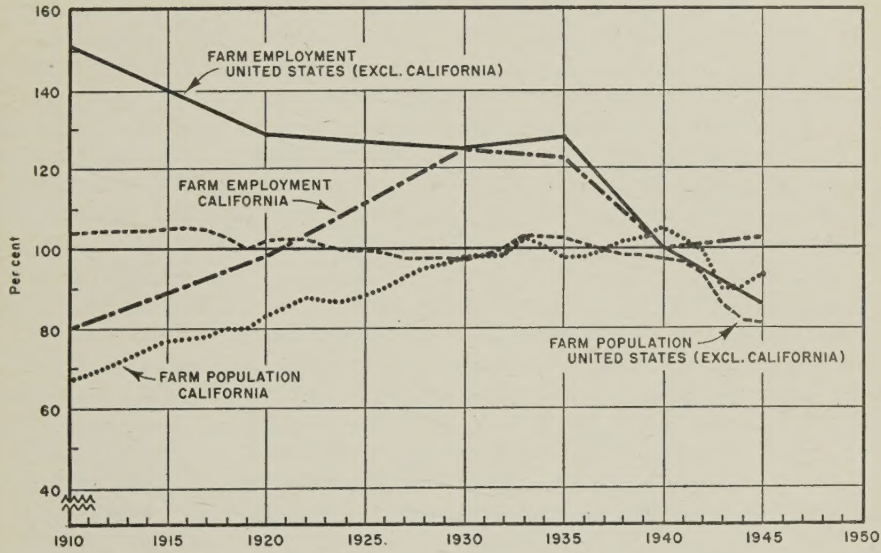
On the production side, the difference in growth rate (and changes over time in this difference) between California and the United States excluding California are connected with the shift (and changes over time in the rate of this shift) in California from dry farming to irrigation agriculture; from general field crops to fruits, nuts, and vegetables; and from range livestock (beef cattle, sheep) to dairying. Total acreage farmed and total cropland underwent only minor changes. Total acreage farmed was (in millions of acres): 1910, 27.9; 1920, 29.4; 1930, 30.4; 1940, 30.5; 1945, 35.1. Total cropland was (in millions of acres): 1910, 11.4; 1920, 11.9; 1930, 11.5; 1940, 12.9; 1945, 11.4. The Census of Agriculture of 1910 was less complete than succeeding ones. The real changes are, therefore, even smaller than those which are statistically indicated. The increase in total acreage farmed between 1940 and 1945 is due to the fact that more public grazing lands and Indian grazing lands are included; this increase does not necessarily mean that more land is used for agricultural purposes.

The shifts represented mainly a great increase in the intensity of California farming—that is, an increase in input and output per acre. Let us look somewhat closer at the nature of these shifts.

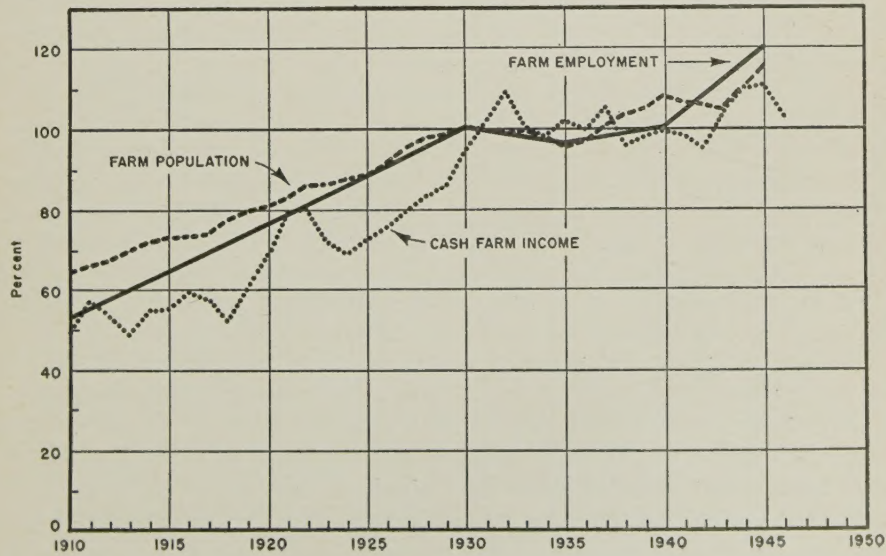


FIG.2.GROWTH OF FARM POPULATION AND FARM EMPLOYMENT IN CALIFORNIA AND IN THE UNITED STATES EXCLUDING CALIFORNIA

A, Farm Population and Farm Employment for California and the United States Excluding California  
Farm Population (1936-1939 = 100)  
Farm Employment (1940 = 100)



B, Ratios of Indices of Farm Population, Farm Employment, and Cash Farm Income in California to Those in the United States Excluding California



On the basis of the Census of Irrigation, irrigated acreage in California increased 1,554,936 acres, or 58.4 per cent, between 1910 and 1920;<sup>3</sup> 527,592 acres, or 12.5 per cent, between 1920 and 1930; and 322,936, or 6.8 per cent, between 1930 and 1940. These rates of increase and their changes by decades are highly significant for California cash farm income for two reasons: First, irrigated acreage is a large percentage of total cropland harvested. On the basis of the 1940 Census of Agriculture, this percentage was 65.4 per cent in California, against 4.3 per cent in the United States excluding California. Second—under nonhumid climates, at least—per-acre productivity is higher for irrigated than for nonirrigated land. On the basis of the 1930 Census of Irrigation (the 1940 census does not permit a similar calculation) irrigated cropland harvested in California produced \$126.05 of crops per acre; nonirrigated cropland harvested produced only \$29.58 per acre—a relation of approximately four to one. The ratio of per-acre productivity between all irrigated land and all nonirrigated land is doubtless even larger but cannot be ascertained statistically.

The greater importance of the irrigated acreage in California (than in the United States excluding California) is significant for the higher cash farm income per person in California which was observed above. Total cropland per person of the farm population is not much larger in California than in the United States excluding California (19.2 acres against 17.3 acres on the basis of the 1940 census). The difference is somewhat greater in total farm land (45.5 acres against 34.5 acres). However, the per-acre productivity of farm land other than cropland is small. On the other hand, there are (1940 census) 6.4 acres of irrigated land per person of the farm population in California against only 0.5 acres in the United States excluding California.

Changes in crop and livestock production are partly induced by expansion of irrigated acreage. Partly, therefore, changes over time in the rate of these changes correspond to the above changes in the rate of increase of irrigated acreage. Until the 1920's, changes of this kind were probably largely responsible for the growth of California cash farm income.

On the other hand, changes in crop and livestock production may take place within irrigation agriculture or (of smaller importance for California) within dry farming. Such changes, therefore, may proceed independently of an increase of irrigated acreage. The main factors in such changes are improvements in technology of production, processing, and marketing; more and better capital equipment; greater use of fertilizer; better soil-conservation practices; and improved varieties of plants and strains of animals. Since the 1920's this second type of change was probably more important for increases in California cash farm income than the first one.

Which one of these two types of change is more important, is significant for the relative growth rates of agriculture in California and in the United States excluding California in the future. California has no particular advantages with respect to the second type of shift. Improvements in technology are not confined to irrigation agriculture. Although the California farm population uses twice as much equipment per head as the farm population in the

<sup>3</sup> The statement made in the text about the Census of Agriculture of 1910 applies also to the Census of Irrigation of 1910—but possibly in a somewhat smaller degree.



United States excluding California (this fact is also significant in connection with the higher cash farm income per person of the California farm population which was observed above), California did not quite maintain this lead in recent decades. On the basis of the census, relative values of farm implements and machinery per person of the California farm population were (United States excluding California = 100) 226 in 1910; 237 in 1920; 209 in 1930; 204 in 1940; and 178 in 1945.<sup>4</sup> In California, fertilizer use is burdened with higher transportation charges than in the East. Soil-conservation practices will probably increase production per acre more in other parts of the country than in California. Improved varieties of plants and strains of animals and better processing and marketing facilities are also of greater importance for states which in these respects are less advanced than California.

Changes in the rate and type of long-time growth of California agriculture are of considerable interest for the analysis of economic fluctuations. A clear differentiation between the influence of long-time growth and of economic fluctuations is necessary for three reasons:

1. The effect of long-time growth applies to aggregate cash income of agriculture but does not usually apply to all branches of production or to all individual farmers. For example, long-time growth in California cash farm income cushioned the decline after 1920. However, some branches of production and many farmers did not participate in this effect, which was, as we know, mainly related to the increase in irrigation agriculture. Economic fluctuations, on the other hand, usually influence all branches of production and all commercial farmers—as shown below.

2. The relative importance of long-time growth and of economic fluctuations may change over time. The cushioning effect just mentioned applied to the economic depression after 1920, but, because of changes in growth rates already explained, much less to the one after 1930. What about the future? There are some indications that the future long-time growth rate of California cash farm income as a whole, at least for one decade, will be closer to the rate prevailing between 1920 and 1930 than to that between 1930 and 1940. Large new public irrigation developments are in construction, or have been authorized, or are contemplated. A rapidly growing nonagricultural population in California provides incentives on the demand side toward further intensification of agriculture. In the more distant future, on the other hand, the growth of California agriculture and of its economy generally is limited by one important factor: the availability of water. How far it will be technically and economically possible to overcome this limitation cannot be foreseen at this time.

3. A differentiation between the influence of long-time growth and of economic fluctuations is necessary because the latter are much more important for the individual farmer. This is true not only because their influence usually affects all farmers. More important is the fact that the magnitude of their influence per unit of time (per year) is much greater. The long-time average growth of California cash farm income from 1910 to 1941 was 3.4 per cent per year. Economic fluctuations, on the other hand, frequently caused deviations

<sup>4</sup> Census data on value of farm equipment are by their nature not very reliable. However, this difficulty is minimized if only ratios are used, as in the text.



from this long-time growth of 20 per cent or more from year to year.<sup>5</sup> For this reason our present study must emphasize the economic forces that cause fluctuations of cash farm income rather than its long-time growth.

In order to focus on the influence of economic fluctuations upon cash farm income, the influence of long-time growth will be taken into account throughout this study by straight-line trends computed for the years 1910 to 1941. Thus, these trends are not influenced by the war and first postwar years. The high values for these years, at the very end of our period of analysis, would have exercised great statistical influence upon the slope of the trends. For reasons which will become apparent below, such a statistical influence seems undesirable because future developments (if they could be taken into account in trend computation) will probably counterbalance the influence of recent years upon the slope of the trends.

In this study, straight-line arithmetic trends computed by the method of least squares are used throughout. Theoretically, logarithmic trends are preferable for most series related to production—for example, cash farm income; for price series arithmetic trends are generally preferable. For comparison, a few experiments with straight-line logarithmic and straight-line arithmetic trends were undertaken. Practically, the difference between the two types of trend was insignificant for the period used for trend computation (1910–1941). It was greater for the period of analysis (1910–1946). It was felt, however, that straight-line arithmetic trends were most easily understood, and that use of different types of trend for different series and different periods might be confusing.

With respect to California, it may be well to repeat that the trends thus computed understate the growth rate of cash farm income from 1910 to 1920, correspond approximately to the growth rate from 1920 to 1930, and overstate the growth rates from 1930 to 1940. It will be shown later that changes in growth rate are related to economic fluctuations. The fact that these changes in growth rate are not taken into account by our trends, is, therefore, no bias for the purpose of our analysis. On the other hand, to take changes in growth rate into account through trends computed by seven- or nine-year moving averages would have restricted our period of analysis too severely and eliminated a part of the fluctuations in which we are interested.

**Fluctuations of Total Cash Farm Income.** Fluctuations of total cash farm income for California and the United States excluding California are shown as relative deviations from trend in figure 1, *B*. It is apparent that there are only small differences in the severity of these fluctuations between California and the United States excluding California. Fluctuations in California tend to be slightly less than in the United States excluding California. This is caused by the relatively (compared with the United States excluding California) smaller importance for California of staple crops and hogs, and the greater importance of vegetables. It will be shown presently that fluctuations in the former branches of production tend to be more violent than in the latter. Generally, however, the close correspondence of fluctuations of cash farm income between California and the United States excluding California is

<sup>5</sup> These deviations are calculated on the basis of yearly averages. On the basis of monthly averages, deviations from year to year would be even greater.



remarkable. This correspondence exists in spite of the differences in the income per person already referred to, and the great differences in the composition of total cash farm income within individual branches of production.

It is generally believed that California agriculture is more immune to economic fluctuations (compared with agriculture in the rest of the country) than seems to be indicated by our findings. Such opinion is based largely on the well-known fact that California farm real estate values per acre showed a less precipitous decline after 1920 than such values in the United States as a whole (Regan, Johnson, and Clarenbach, 1945, table 1).<sup>6</sup> It is necessary, therefore, to scrutinize this apparent contradiction.

Farm real estate values are averages by crop reporting districts. These averages are not weighted by type and size of farm. The state average is obtained by combining the district averages through weighting by total land in farms within districts. Before 1934 no attempt was made to differentiate between dry-farmed and irrigated land. Crop reporter's estimates are strongly influenced by sales prices of transfers that come to their attention. Because of these methods of computation, changes in the state average are decisively affected by a rapid shift from dry farming to irrigation agriculture. It was shown above that such a shift was still in full swing for California around 1920. This shift increases greatly the value of individual transfers: in 1945 the average value per acre in selected counties, seven western states, was \$21.26 for grazing land, \$111.83 for cultivated nonirrigated lands, and \$384.82 for irrigated land (Stonecipher and Dunn, 1946, table 2).<sup>7</sup> In addition, such a shift increases the weight of irrigated land in the average because irrigated farms are smaller and change hands more often. On the basis of the 1920 Census of Irrigation, the average size of irrigated farms in California was 62.6 acres; the average size of nonirrigated farms was 500.1 acres. The corresponding figures for the 1930 Census of Irrigation were 55.3 acres and 515.0 acres. After 1930 this influence was much smaller because, as we know, the expansion of irrigated land had slowed down, and because (since 1934) the statistically essential differentiation between major types of land was made in computing averages. From then on, changes in California real estate values per acre are close in direction and amplitude to such changes for the country as a whole. This parallelism would probably appear earlier also if proper statistics were available. The census cannot be used for testing because suitable data appear only in 1930 and 1940 censuses.

Besides the parallelism of major fluctuations of cash farm income in California and the United States excluding California, their quantitative significance (that is, in terms of amplitude and time) deserves emphasis. The following low and high annual averages, in per cent of trend, indicate the amplitude of major fluctuations since 1914:<sup>8</sup>

	1914	1919	1921	1929	1932	1946
California .....	68	157	107	132	65	246
Other states .....	70	172	94	130	53	270

<sup>6</sup> See "Literature Cited" for citations, referred to in the text by author and date.

<sup>7</sup> It may be noted that the value ratio of irrigated land to cultivated nonirrigated land is slightly less than 4:1. This situation agrees well with the per-acre productivity ratios computed above.

<sup>8</sup> As already implied (footnote 5), high and low points would indicate considerably greater amplitude of fluctuations if daily or monthly averages had been used instead of annual.



The farmer is chiefly concerned with these major fluctuations, rather than long-time trend and minor year-to-year oscillations.

In order to analyze the forces causing these fluctuations of total cash farm income, it is important to ascertain whether and to what extent the major branches of California agriculture were affected.

### **Fluctuations of Cash Farm Income within Major Branches of Production.**

For our purposes the following four branches of production may be differentiated: (1) livestock and livestock products; (2) fruits and nuts; (3) vegetables; (4) field crops. Cash farm income for these branches is shown in figure 3.

It is evident that all branches show characteristics of trend similar to those discussed above for total cash farm income. However, the difference in the rates of long-time growth between California and the United States excluding California is not so noticeable in livestock and livestock products as in the other branches. The livestock industry was less affected than crop production by the shifts to irrigation agriculture and to more intensive land use with which, as we know, the stronger long-time growth of California agriculture was connected. As in total cash farm income, absolute and relative (as compared with the United States excluding California) growth rates in California are largest from 1910 to 1920, somewhat less from 1920 to 1930, almost disappeared between 1930 and 1940, and show an increase since then.

For studying fluctuations of cash farm income within branches of production, long-time growth was taken into account by the same method explained above for total cash farm income. The results are shown in figure 4. It can be seen that for all series, major fluctuations are similar for California and for the United States excluding California. Within the individual sets, however, some considerable differences exist. It is advisable, therefore, to discuss the four sets individually.

Fluctuations in cash farm income from livestock and livestock products show an amplitude similar to that of total cash farm income and a similar close correspondence between California and the United States excluding California, except a smaller expansion in California during the two war periods (fig. 4, A). This exception may be explained as follows: California's most important feed base—the natural range—is rather fixed, and is more suited for beef cattle, sheep, and dairying than for hogs. For the United States excluding California, on the other hand, hog production based on home-grown grain is much more important. These differences are reflected in the data in the table on the next page. Biologically, and on account of the feed base, the hog enterprise permits a quicker and larger expansion under the stimulus of high prices than other livestock enterprises, except poultry. California's important poultry industry, however, was handicapped during wartime because it is largely based on imported feed. One may also note (fig. 4, A) that the well-known production cycles in livestock, especially in cattle, hogs, and sheep, had, as compared with the economic fluctuations in which we are interested here, only a small effect upon changes in aggregate income. This effect is noticeable mainly by causing slight differences between our two series during 1927–28 and 1936–37. In both periods general economic conditions were relatively stable. During these periods the peak of slaughtering in the hog cycle was espe-



cially high (and the trough of prices and incomes especially low) because of extreme fluctuations of corn yield. As already mentioned, California is less affected by the hog cycle than the United States excluding California, because of the smaller importance of hogs and of corn yield for production fluctuations. The relative importance of cash farm income from the various livestock industries in 1926 to 1929,<sup>o</sup> expressed in per cent of income from all livestock and livestock products, was as follows:

	California, per cent	United States excluding California, per cent
Dairy products .....	34.9	28.9
Cattle, calves .....	27.0	24.0
Eggs and chickens.....	21.2	17.5
Sheep, lambs, wool.....	9.4	5.1
Hogs .....	5.1	22.8
Other .....	2.4	1.7
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All livestock and livestock products	100.0	100.0

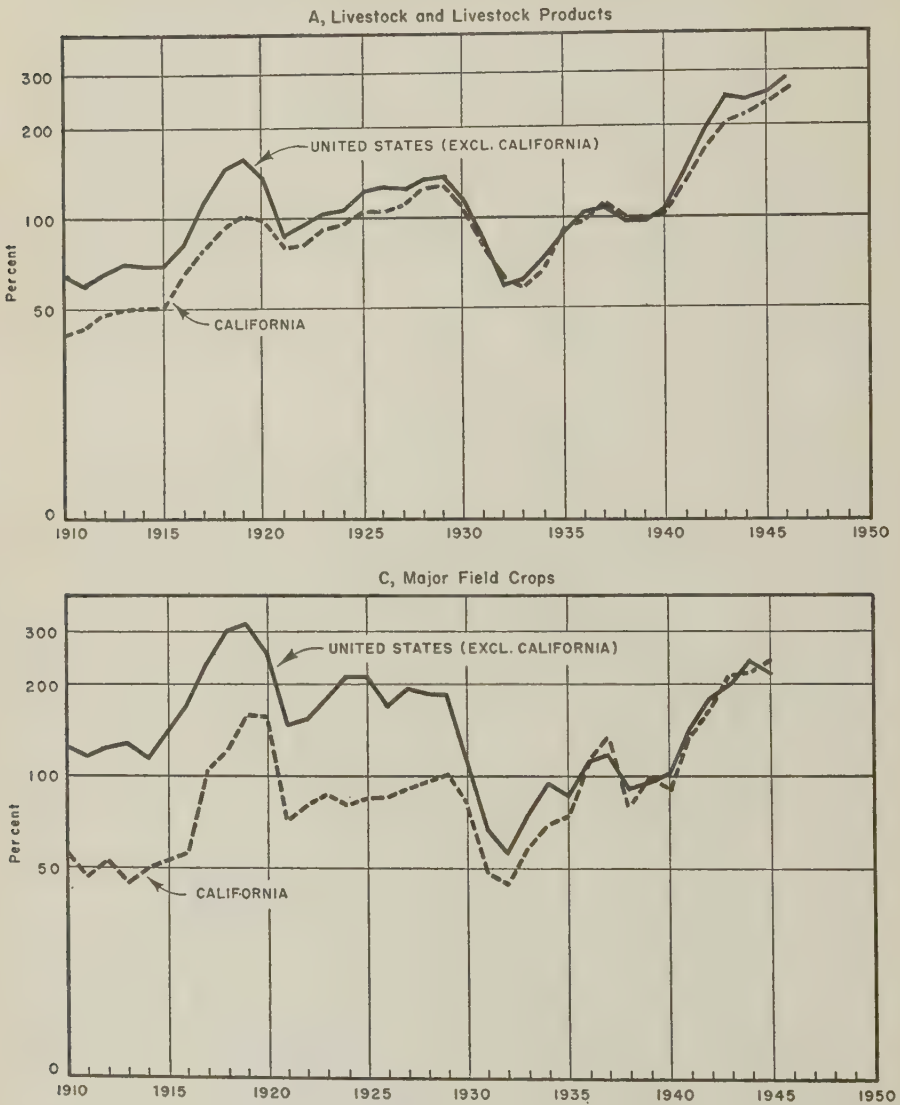
The various fruit and nut enterprises in California differ greatly in importance from those in the United States excluding California. The following data show the relative importance of cash farm income from the various fruits and nuts in 1926 to 1929, expressed in per cent of income from all fruits and nuts:

	California, per cent	United States excluding California, per cent
Oranges .....	37.0	7.5
Grapes .....	17.7	2.9
Lemons .....	8.8	0.0
Prunes .....	6.6	1.2
Nuts .....	6.1	2.4
Peaches .....	6.1	10.1
Apricots .....	4.4	0.1
Pears .....	3.8	3.6
Apples .....	3.0	41.6
Strawberries .....	1.5	14.2
Cherries .....	1.1	2.9
Grapefruit .....	0.7	5.3
Others .....	3.2	8.2
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All fruits and nuts.....	100.0	100.0

In fruits and nuts, furthermore, variations in yields between years and between regions are especially great. In spite of these conditions, the correspondence between income fluctuations in California and in the United States excluding California is rather close both in direction and amplitude (fig. 4, B).

<sup>o</sup> The four-year period 1926 to 1929 is chosen for this and the following tabulations in this section because it is the center of the period 1910 to 1945; is the beginning of a period of better statistical data; and is, comparatively, a period of economic stability.

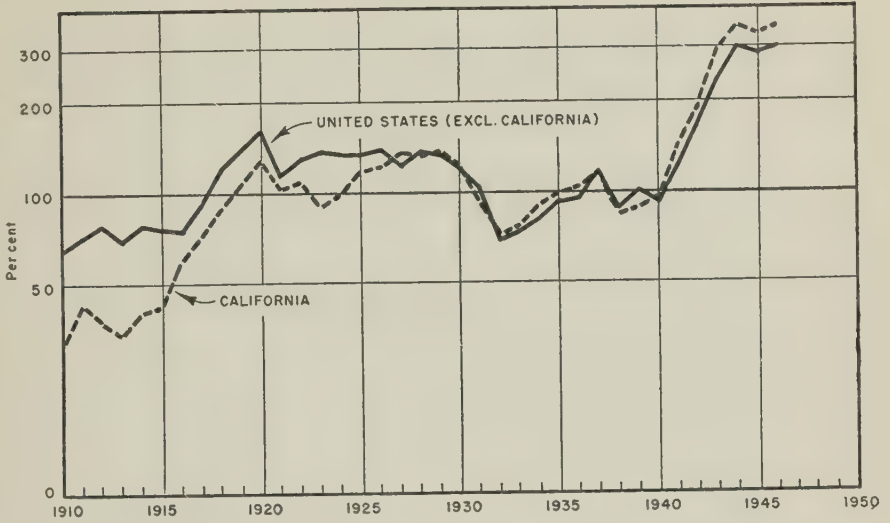
FIG. 3. CASH FARM INCOME BY MAJOR BRANCHES OF PRODUCTION FOR





CALIFORNIA AND THE UNITED STATES EXCLUDING CALIFORNIA (1935-1939=100)

B, Fruits and Nuts



D, Vegetables.

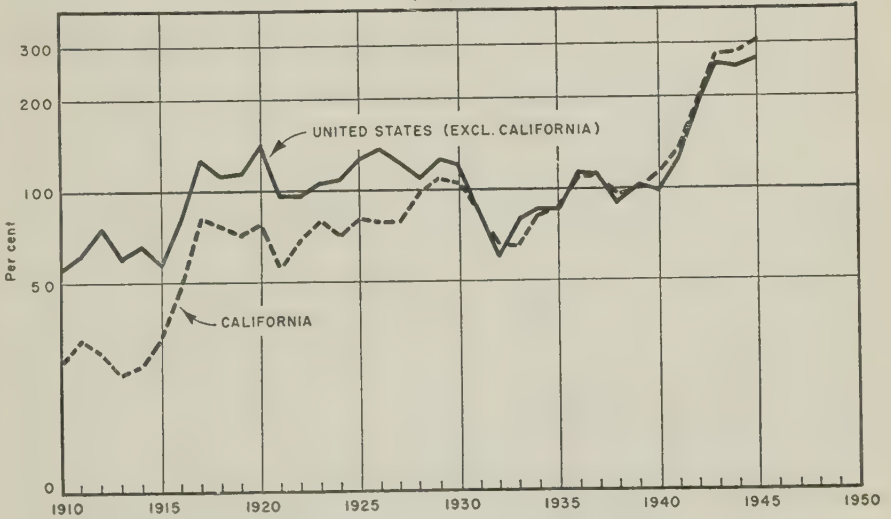
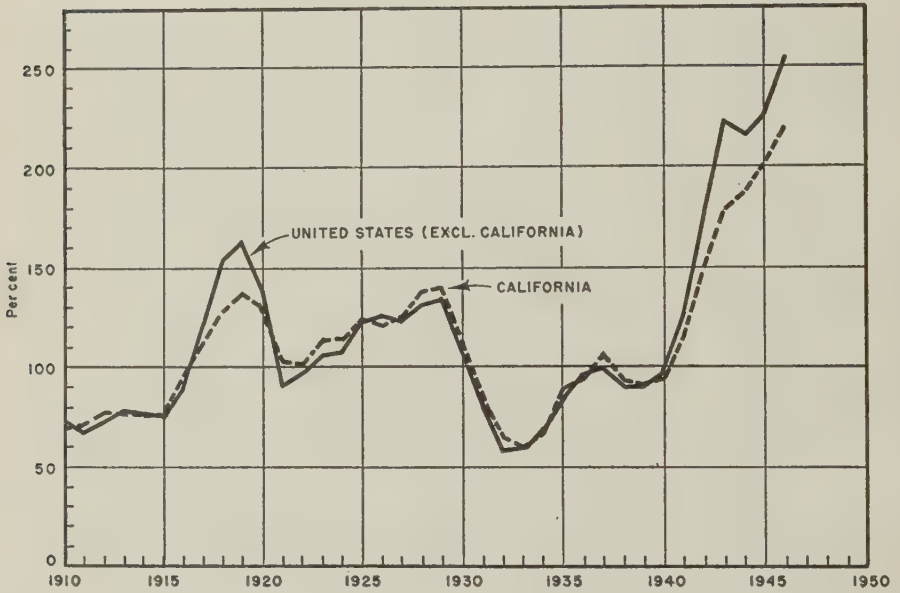
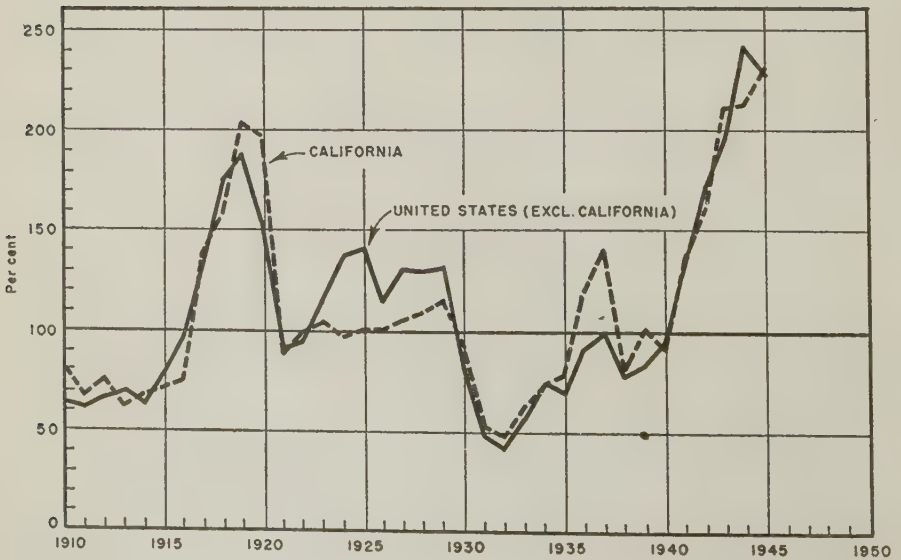


FIG. 4. CASH FARM INCOME BY MAJOR BRANCHES OF PRODUCTION FOR

A, Livestock and Livestock Products



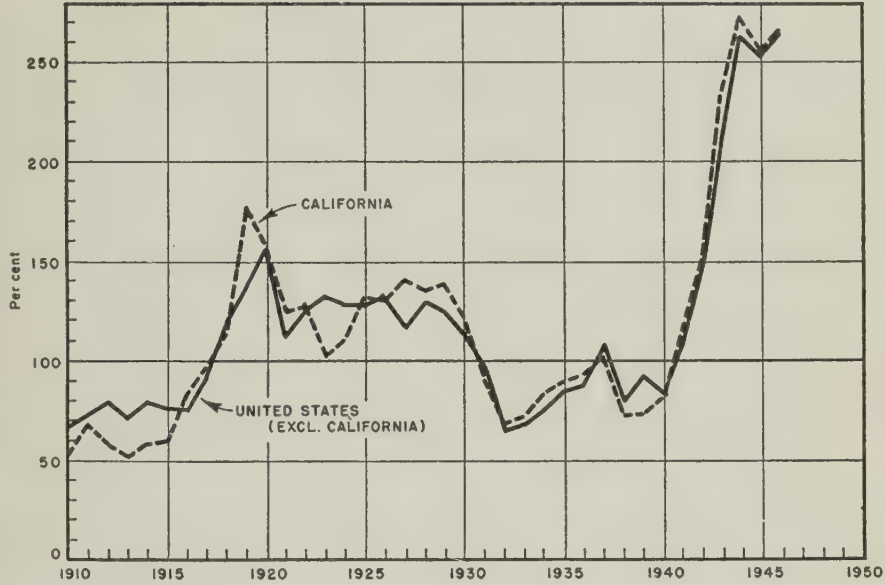
C, Major Field Crops



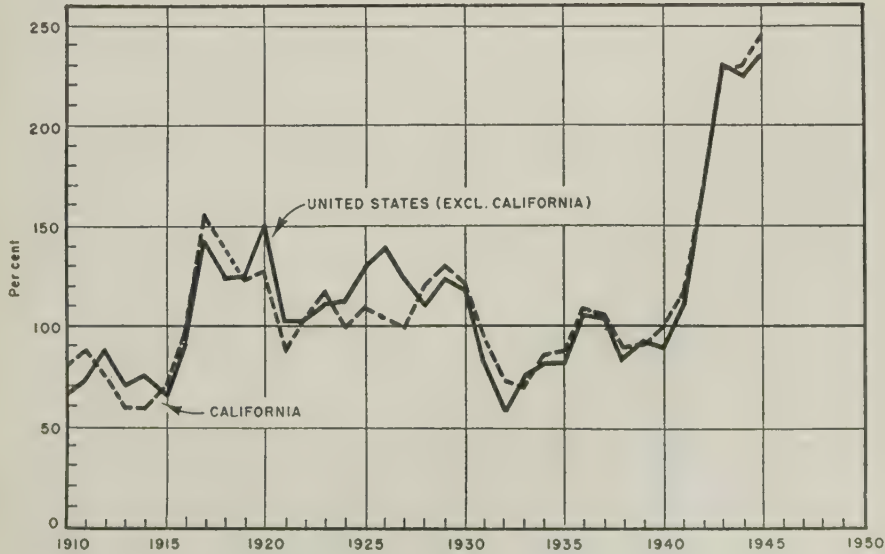


CALIFORNIA AND THE UNITED STATES EXCLUDING CALIFORNIA (TREND = 100)

B, Fruits and Nuts



D, Vegetables



The major discrepancy lies in the behavior of the two series between 1919 and 1923. This discrepancy may be explained largely by relatively good income from apples, which have great weight in the United States excluding California, but small weight in California, and by poor income from grapes (prohibition became effective in January, 1920), the relative weights of which are the opposite from those of apples. Fluctuations between 1910 and 1930 were more violent in California than in the United States excluding California. This is noteworthy because students who contend that California was more immune to economic fluctuation in the beginning of the 1920's usually point to California's specialities as an explanation.

Income from major field crops in the United States excluding California is heavily weighted by cotton, whereas hay is relatively more important for California. The relative importance of cash farm income from the various field crops in 1926 to 1929, expressed in per cent of income from all major field crops, is shown in the following data:

	California, per cent	United States excluding California, per cent
Cotton and cottonseed.....	25.0	48.6
Wheat .....	21.4	27.5
Hay .....	19.7	4.6
Barley .....	18.6	1.2
Rice .....	12.4	1.1
Oats .....	1.6	3.8
Corn .....	1.3	13.2
All major field crops.....	100.0	100.0

The differences between the two series, therefore, are largely explained by differences in the prices (and to a smaller degree in yields) of cotton and hay (fig. 4, *C*). This is true, for example, for the greater and more erratic increase in the United States series between 1921 and 1929 and the especially good showing of California during the drought period in the second half of the 1930's. The great differences in the relative weight of individual grains between the two series are of no fundamental importance for price movements; grain prices, as a whole, move in close unison because of substitution. Differences in yields, however, were important during the middle of the 1930's. California was less affected by the drought; rice is grown under irrigation, and is of much greater importance in California than in the United States excluding California. Beyond these differences, figure 4, *C*, reveals clearly that the income from major field crops shows the same cyclical fluctuation in direction and amplitude in California as in the United States excluding California. Fluctuations around 1920 were at least as violent in California as in the rest of the country. The direction of fluctuations corresponds closely with those observed in the two previous groups of commodities; their amplitude, however, is greater.

In contrast to the income from "staples" just discussed, income from vegetables shows less amplitude in cyclical fluctuations—although fluctuations are clearly present and correspond in direction to those already noted (fig. 4, *D*).



Year-to-year variations in yields and acreage and their effects upon yearly and seasonal price movements are of greater significance (in relation to cyclical fluctuations) for vegetables than for other groups of products. These variations are frequently different in direction between California and the United States excluding California. Furthermore, great differences exist in the relative importance of individual vegetables between the two regions, as shown by the following data on cash farm income from various vegetables in 1926 to 1929, expressed in per cent of income from all vegetables:

	California, per cent	United States excluding California, per cent
Dry edible beans.....	19.5	6.6
Lettuce .....	18.7	2.8
Cantaloupes .....	11.0	2.2
Asparagus .....	7.9	1.3
Potatoes .....	7.4	41.7
Tomatoes .....	7.4	9.7
Peas, green .....	4.7	3.6
Celery .....	3.5	2.7
Onions .....	3.2	4.9
Cauliflower .....	2.9	0.6
Artichokes .....	2.5	0.0
Sweet potatoes .....	1.4	4.8
Beans, snap .....	1.2	3.7
Watermelons .....	1.2	2.3
Cabbage .....	0.9	4.5
Cucumbers .....	0.7	2.3
Others <sup>10</sup> .....	5.9	6.3
All vegetables.....	100.0	100.0

The United States series is heavily weighted with potatoes, which have great yearly variations in yield and acreage. For California, on the other hand, income from such highly perishable commodities as lettuce, cantaloupes, and asparagus looms large. Furthermore, California's cash income from vegetables is more affected by beans than that of the United States excluding California. The differences between the two series during and shortly after World War I are largely explained by the latter factor.

We have seen that the major economic fluctuations affect the cash income of the California farmer much as they affect the income of farmers in the rest of the nation; that all major types of production are affected; and that their aggregate effects are greater on cash income than are those of trend or changes caused by harvest fluctuations and cycles in livestock production. Our next question, therefore, is: What factors cause major economic fluctuations?

<sup>10</sup> "Others" includes, for California, carrots, Honey Ball melons, Honey Dew melons, pimientos, green peppers, and spinach; for the United States excluding California, carrots, Honey Ball melons, Honey Dew melons, pimientos, green peppers, spinach, lima beans, sweet corn, eggplant, beets, escarole, and kale.

FIG. 5. CASH FARM INCOME, PRICES RECEIVED BY FARMERS, AND QUANTITY OF FARM MARKETINGS FOR THE UNITED STATES (TREND = 100)

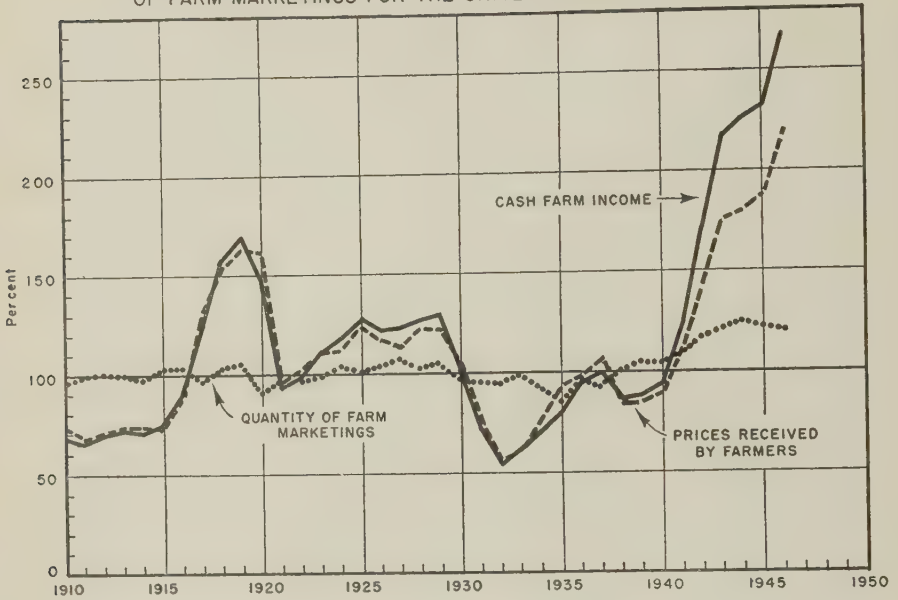
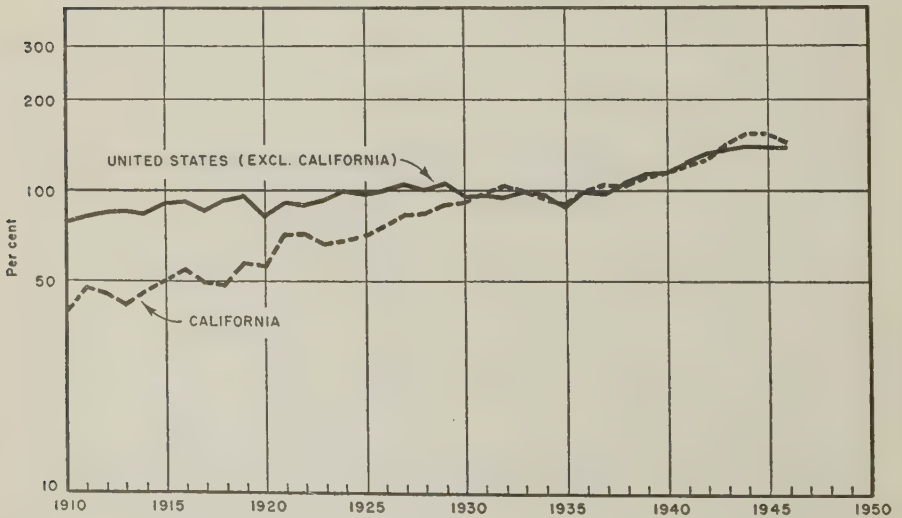


FIG. 6. QUANTITY OF TOTAL FARM MARKETINGS FOR CALIFORNIA AND THE UNITED STATES EXCLUDING CALIFORNIA (1935 - 1939 = 100)





### 3. PRICES AND PRODUCTION AS FACTORS AFFECTING FLUCTUATIONS OF CASH FARM INCOME

*Summary.* Major fluctuations of cash farm income for California and for the United States excluding California are largely price and not production phenomena. Quantities of farm marketings and production are rather stable, both for California and the United States excluding California. The rate of long-time growth in these quantities gives support to the method by which this rate was taken into account in the preceding section. Deviations from the rate of long-time growth (downward between 1929 and 1935 and upward between 1935 and 1946) do not account for major price changes. Price changes, on the other hand, appear to have influenced production in the same direction.

**Fluctuations of Income and Prices.** Cash income from farm marketings has two components: price and quantity. Although the latter is not identical with production, for brevity's sake, the two terms may be used interchangeably here. As indicated in the preceding section, human consumption by farm families of home-produced commodities is small in relation to marketings. Home production of feed, draft-power, and other services finds sufficient expression, at least for the purposes of this study, in the quantity of marketings.

If fluctuations in cash farm income and in prices are compared (fig. 5), it is at once apparent that the former are mainly price and not production phenomena. To be sure, differences in the two series are present. For example, the cash income series is considerably above the price series during World War II. During this period price increases were dampened by government controls. The war effort in production, on the other hand, was aided by good harvests, by depletion of soil fertility previously accumulated through the soil-conservation program, and by technological improvements—especially by greater use of fertilizers and improved plant and livestock varieties. The drought period in the middle 1930's caused another slight divergence of the two series. However, in the main, fluctuations of cash farm income are explained in direction as well as amplitude by fluctuations of prices.

**Fluctuations of Income and Quantity.** It can be expected from the interrelations just observed that the second component of gross income—namely, quantity of production and of marketings—is in the aggregate a relatively (compared with prices) stable factor (fig. 5). This is also borne out for California and the United States excluding California by the quantity indices presented in figure 6. These series were obtained by deflating the cash-income series (fig. 1) by the index of prices received by farmers in the United States. Theoretically, use of a common deflator for both series is not desirable, but was necessitated by the absence of an adequate farm price index for California. Practically, the bias involved is not likely to be material—as may be concluded from the relations already observed (figs. 1 and 5). The results are in good agreement with production indices computed for the United States and the

Pacific Coast states by the Department of Agriculture (Barton and Cooper, 1945). California production weights heavily in the total production of the Pacific Coast states.

The long-time upward trend and the differences in slope of this trend between California and the United States excluding California are almost identical for cash income and quantity marketed (figs. 1 and 6). The differences between decades in rates of long-time growth, which were discussed in the preceding section, are clearly noticeable in the quantity series. In general, however, the series support the rationale for computing a straight-line trend both for production and cash farm income. This is especially true because the strong upswing in production during World War II must probably be somewhat discounted in its significance for long-time trend. It has already been mentioned that this upswing was aided by good harvests, by depletion of soil fertility, and by better varieties of plants and strains of animals; these factors cannot be expected to operate to the same extent in the future. The decrease in the middle of the 1930's, which is more evident in the United States excluding California than in California, was largely due to the drought.

It may be noted that the period during which production rose faster than a straight long-time trend, that is, between 1935 and 1946, was also a period of rising prices. When prices declined between 1929 and 1935, the increase of production was markedly retarded, especially in the United States excluding California. Likewise, price fluctuations before 1929 do not correspond to fluctuations of production in the opposite direction. There is no indication, therefore, that variations in the volume of production were the cause of major fluctuations in prices. On the other hand, there is some indication that major swings in prices caused changes in the volume of production in the same direction.

Prices of farm products in this country are related to quantities marketed domestically *and* to marketings by foreign producers, as far as the latter influence international trade. Space does not permit a detailed review of quantities of agricultural products marketed in trading nations other than the United States. It has been shown elsewhere (Ciriacy-Wantrup, 1936, 1938*a*, 1938*b*) that our findings with respect to the relatively great stability of aggregate quantities of farm marketings and with respect to the parallelism between relatively small fluctuations of quantities and relatively great fluctuations of price, which were illustrated in figures 5 and 6 for the United States, hold also, and possibly more so, for the world's trading nations as a whole. In a later section (section 5), we will return to the relations between farm prices and cash farm income in the United States on one side and foreign trade on the other.

In this section we have seen that fluctuations of cash farm income are largely price and not production phenomena. The next step in our analysis is to determine whether prices of productive services and charges show fluctuations similar to those of farm prices and cash farm income. It will then be possible to draw conclusions with respect to changes of the farmer's fortunes during economic fluctuations.



#### 4. TREND AND FLUCTUATIONS OF PRODUCTION EXPENSES AND CHARGES SINCE 1910

*Summary.* Price fluctuations, which were shown responsible for fluctuations in cash farm income (sections 2 and 3), appear also in fluctuations of farm wage rates and of prices of commodities used in production. These latter fluctuations, however, partly lag behind the former (as in the case of wage rates and farm-machinery prices) or show a considerably smaller amplitude (as in the case of prices of manufactured products in general). Real estate taxes and mortgage-interest burden exhibit even more lag and even smaller amplitude of fluctuations than production expenses. The mere fact of general price fluctuations, therefore, changes the economic position of farmers decisively. During the upswing the economic position of farmers tends to improve, during the downswing, to worsen.

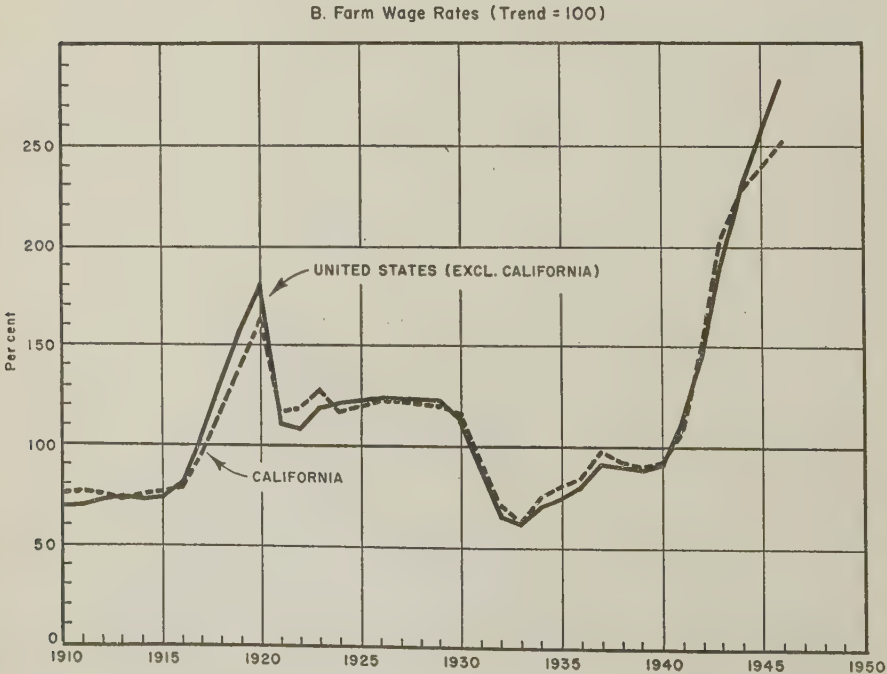
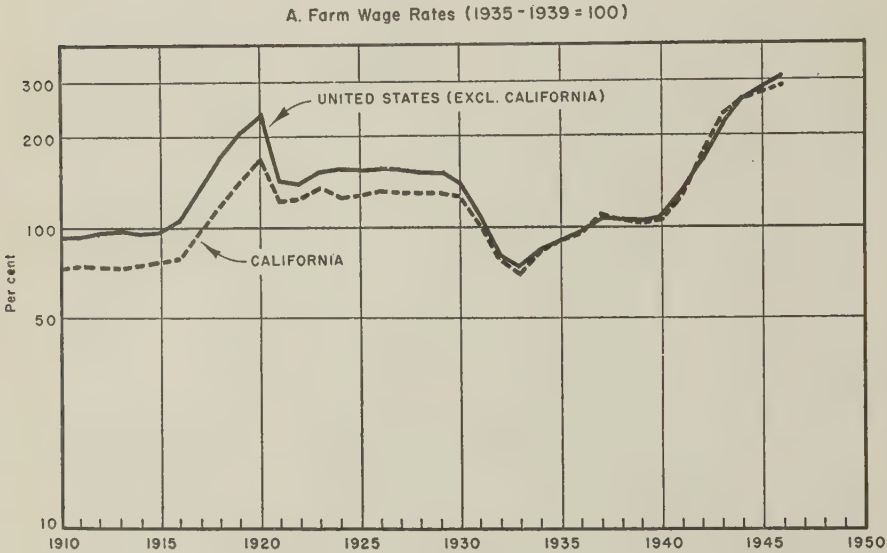
**Significance of Fluctuations in Production Expenses and Charges.** If prices of productive services and charges do not show the same fluctuations in direction or amplitude as prices received, the economic position of farmers will change in the course of price fluctuations.

The money net income of farmers would change in the course of economic fluctuations even if prices of productive services are assumed to change at exactly the same time and rate as prices received, and other factors (such as shifts of demand between products, changes of technology, and weather influences) are assumed unchanged. During the upswing, net income would increase, and during the downswing decrease, provided gross income is greater than expenses. However, such changes of net income would be of minor importance for the economic position of farmers because the purchasing power of net income would not be different than before if *all* prices in the economy (not only prices of productive services and of products) change at the same rate.

The changes in economic position we have in mind here are practically and analytically much more important. Our first objective is to point out these changes. Our second objective is to ascertain whether the extent and character of price fluctuations give any clues about their causes; to clarify these causes is the objective of the subsequent sections. Do price fluctuations extend also to wage rates? If so, how do timing and amplitude of fluctuations in wage rates compare with those in prices? Are there characteristic differences in amplitude of price fluctuations within various groups of commodities used in agricultural production? If so, what explains these differences? What is the relation between price fluctuations and those expenses of agriculture that are not prices—for example, the interest burden and the tax load?

**Wage-Rate Fluctuations.** Fluctuations in farm wage rates (fig. 7) are of special significance; for labor is the most important of production expenses incurred by California farmers. That this expense is relatively more important in California than in the United States excluding California is shown by the

FIG. 7. FARM WAGE RATES (PER DAY WITHOUT BOARD) FOR CALIFORNIA AND THE UNITED STATES EXCLUDING CALIFORNIA



following data, giving percentage distribution of production expenses and charges for the period 1939 to 1944:

	California, per cent	United States excluding California, per cent
Hired labor .....	33.3	16.0
Feed purchased .....	16.0	16.8
Livestock purchased .....	6.1	8.7
Cost of operating motor vehicles....	5.9	8.3
Taxes .....	4.5	5.5
Buildings (maintenance or depreciation) .....	3.1	7.3
Farm-mortgage interest .....	2.8	3.4
Motor vehicles (maintenance or depreciation) .....	2.7	4.8
Machinery and equipment (maintenance or depreciation) ....	2.1	4.2
Fertilizer and lime .....	1.7	4.3
Miscellaneous .....	21.8	20.7
<hr/>		
Total production expenses and charges .....	100.0	100.0

There is considerable difference in absolute level of wage rates between California and the United States excluding California. Farm wage rates per day without board for the six years 1939 to 1944 (chosen for comparability in time with the above percentage-distribution data) averaged \$4.61 for California and \$2.46 for the United States.<sup>11</sup> Magnitude and causes of these differences correspond to similar ones discussed above in connection with cash farm income per person of the farm population. In spite of these great differences in level, and in spite of some differences in the slope of trend<sup>12</sup> during the first three decades of our period, fluctuations of wage rates in California were closely similar to those of the United States as a whole. It may be noted that the slight difference between the two series in the amplitude of movement from 1917 to 1921 corresponds to the differences between the two cash farm income series during the same period (fig. 1, p. 3). The same correspondence holds also for other periods when the differences between the California and the United States series were less conspicuous. This observation is important because (in the absence of adequate price data for California mentioned above) we must confine our comparison between fluctuations of wages and prices to the United States. However, since fluctuations in gross farm income are largely fluctuations in prices (fig. 5), and are closely similar for California and the United States excluding California (fig. 1), the relation between wage rates and price fluctuations for the United States as a whole (fig. 8, A) can be expected to hold also for California separately.

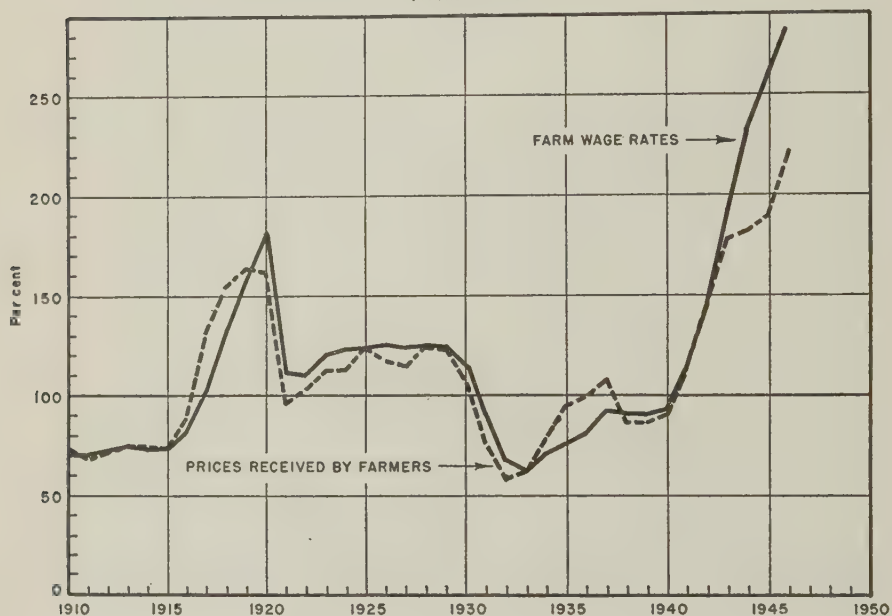
<sup>11</sup> Unfortunately an average for the United States excluding California is not available.

<sup>12</sup> For California  $b = +0.270$ ; for the United States  $b = -0.297$ . Inclusion of the war years 1942 to 1945 would render the slope of the United States trend also positive. A difference in slope, however, would remain. This difference would be even greater if it had been possible to use data for the United States excluding California.

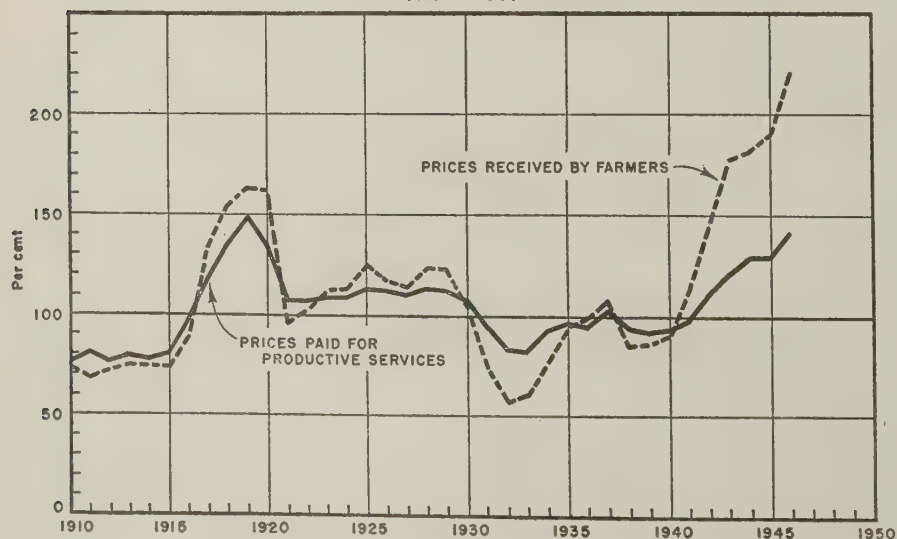


FIG. 8. PRICES RECEIVED AND PRICES PAID BY FARMERS, UNITED STATES

A, Farm Wage Rates (per Day without Board) and Prices Received by Farmers  
(Trend = 100)



B, Prices Paid for Productive Services (Other than Labor) and Prices Received by Farmers  
(Trend = 100)



It is apparent from figure 8, *A*, that wage-rate fluctuations have followed price fluctuations with a slight lag, but with approximately the same amplitude. An exception is the period of World War II, when wage rates far outstripped prices. The causes for this exception are differences in public policies with respect to price and wage control. The flexibility of wage rates would have appeared even greater if data relating to rates with board had been used. Rates without board, however, are of greater significance for California agriculture. In industrial countries like the United States, the greater flexibility of farm wage rates—if compared with industrial wage rates—is related to less rigid unionization of the agricultural labor market, to the greater importance of payment in kind, and, particularly, to rural-urban and urban-rural migration during economic fluctuations. It has already been mentioned that California's farm population was considerably influenced by these migrations (section 2).

Wage rates change the economic position of farmers in the course of price fluctuations mainly through lag rather than through rigidity. The lag in the movement of wage rates behind that of prices received tends to impair the economic position of farmers in the beginning of price decreases, and to improve it in the beginning of price increases. On the other hand, the flexibility of wage rates for farm labor (together with the flexibility of remuneration under which the operator and his family work) is one of the reasons for the great stability of agricultural production which was noted above (fig. 6).

**Fluctuations in Other Productive Services.** In considering prices of productive services other than labor, our analysis must again be confined to the United States as a whole, because no adequate price data are available for California. It can be assumed that the level of California prices is somewhat higher because most productive services are imported from other parts of the country. More importantly, differences in weighting between California and the United States excluding California (p. 23) influence fluctuations of the over-all price index of productive services. It will be shown presently that prices of different groups of productive services behave differently during price fluctuations. But still, results obtained from an analysis of these individual groups for the United States as a whole are significant also for California.

Prices paid by farmers for productive services other than labor fluctuate with a distinctly smaller amplitude than prices received (fig. 8, *B*). This tends to improve the economic position of farmers when prices rise and to worsen it when prices fall. The index of prices paid for productive services comprises several groups of prices, the movements of which warrant separate analysis for reasons already indicated.

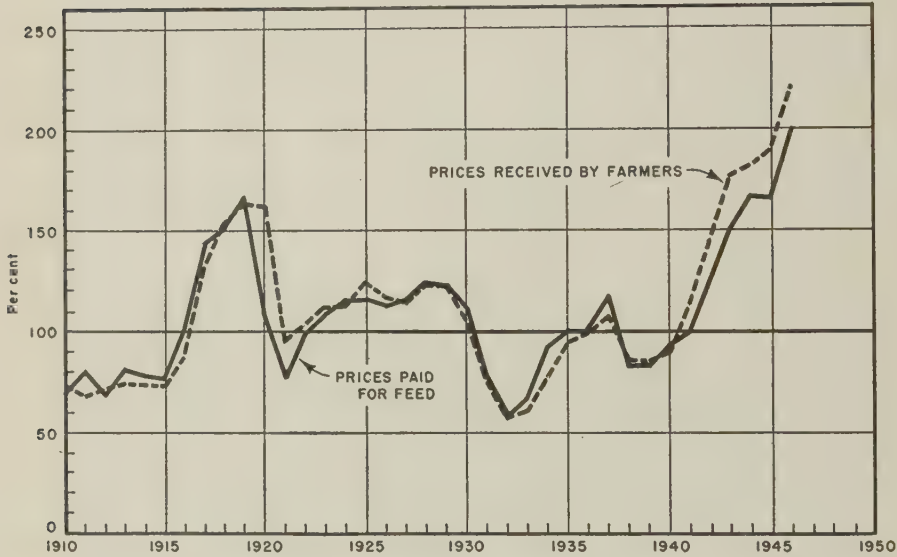
There are, first, the fluctuations of feed prices (fig. 9, *A*). Feeds are largely farm-produced commodities. Fluctuations in feed prices, therefore, closely correspond to those of prices received. The relatively small differences between the two series are largely due to the fact that feed prices are more heavily weighted with grains. Feed prices, however, are obviously not the component of the general cost-price index (fig. 8, *B*) which is responsible for the smaller amplitude in the latter's fluctuations compared with those of prices received.

This situation is quite different with prices paid for farm machinery (fig.

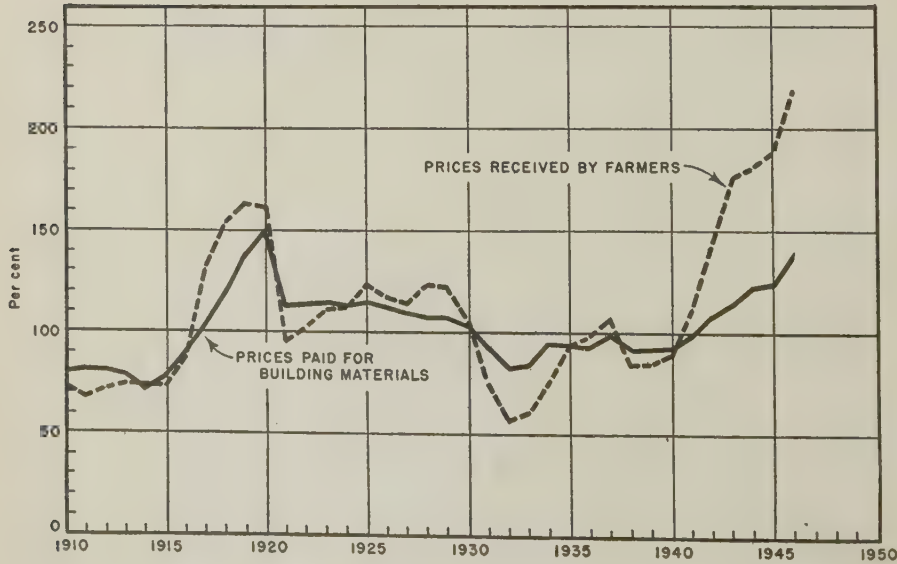


FIG. 9. PRICES RECEIVED AND PRICES PAID

A, Prices Paid for Feed and Prices Received by Farmers

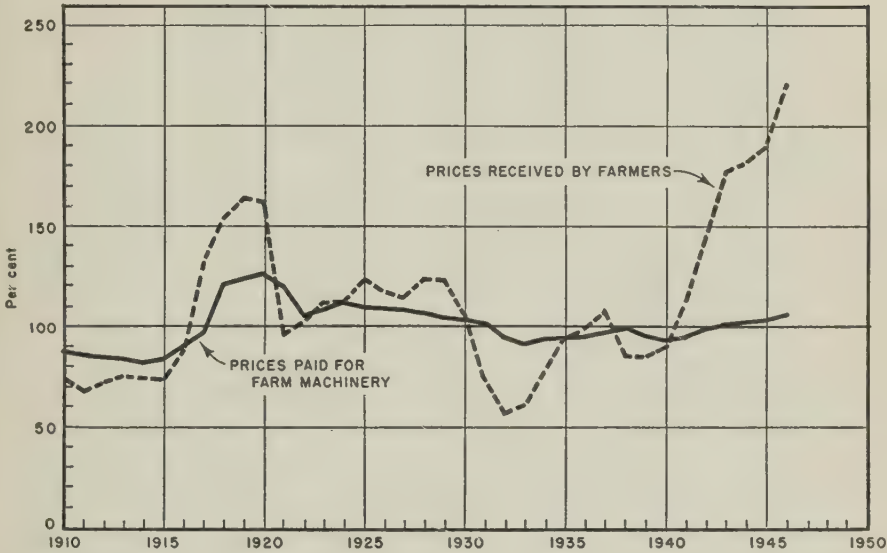


C, Prices Paid for Building and Fencing Materials (other than Houses) and Prices Received by Farmers

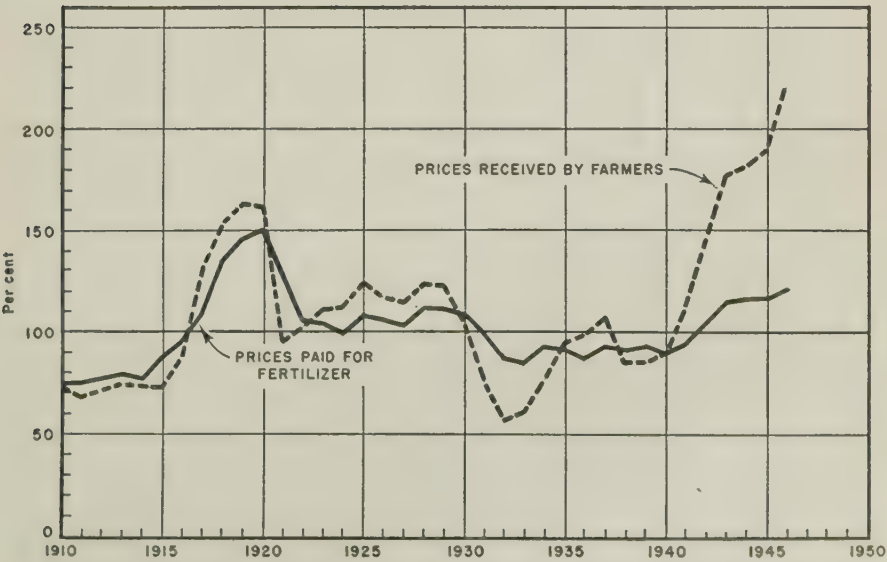


BY FARMERS, UNITED STATES (TREND = 100)

B, Prices Paid for Farm Machinery and Prices Received by Farmers



D, Prices Paid for Fertilizer and Prices Received by Farmers



9, B). These prices barely show fluctuations. The small fluctuations that are present correspond in direction to those of prices received, but with a lag of one year or more. It is less important that the trend was slightly upward ( $b = +0.534$ ). This difference relative to the trend of prices received by farmers was probably more than offset by technological improvements of farm machinery. In other words, equal efficiency units of farm machinery have probably decreased in price relative to farm products.

The behavior of prices paid for farm machinery is also characteristic of prices paid for most other manufactured products. For example,<sup>13</sup> prices paid for building and fencing materials (fig. 9, C) and for fertilizer (fig. 9, D) show much narrower fluctuations than do prices received.<sup>14</sup> The degree of difference, however, is somewhat smaller than with farm-machinery prices.

The various, rather complex reasons for the rigidity of prices of manufactured products relative to prices received by farmers were treated in detail elsewhere (Ciriacy-Wantrup, 1939, 1940). Within the scope of this study it is sufficient to note that the difference of amplitude in the fluctuations of prices received and of prices paid for manufactured products is an important factor in changing the economic position of farmers in the course of general price fluctuations. It tends to improve their position during the upswing and to impair it during the downswing. This rigidity does not prevent stability of agricultural production—encouraged, as we have seen, by the flexibility of farm wage rates—because, during depressions, farmers can postpone buying machinery and fertilizer; they can use old equipment and deplete the soil.

**Fluctuations in Taxes and Interest.** Prices paid for labor, feed, and manufactured products are not the only items we have to consider. For California farmers as a whole, real estate taxes and mortgage interest are of considerable importance (p. 23). Taxes and interest show little resemblance to the fluctuations in gross income and production expenses, except a decrease after 1930 under the influence of foreclosures and of special public relief measures (fig. 10).<sup>15</sup> The importance of the rigidity of charges for the economic position of farmers has often been emphasized, especially with respect to the adjustment period after World War I. This rigidity exists today also. However, there is an important difference in the level of these "fixed" charges between the situation after World War I and that prevailing now. Although taxes per acre have risen in recent years (fig. 10), the pre-1930 level has not been reached. On the other hand, net income per acre and land values have far surpassed their 1930 level. The interest burden has steadily fallen since 1930, partly because interest rates have fallen (see fig. 22, p. 56), and partly because farmers have used their increased income during World War II more

<sup>13</sup> The two other groups of manufactured products in the general index of prices paid (fig. 7, B) are automobiles, trucks, and tractors, and materials and supplies. The former group price index is not available separately. The latter's behavior closely resembles that of building and fencing materials.

<sup>14</sup> The trend of fertilizer prices is downward ( $b = -0.410$ ) reflecting the rapid technological development in the chemical industries, particularly in the production of nitrogen. The trend of prices for building and fencing materials, like that for farm machinery, is upward ( $b = \pm 0.412$ ).

<sup>15</sup> This lack of resemblance is so obvious that elimination of trend and comparison with prices received seemed unnecessary. Also, the data of fig. 10 are not strictly comparable with prices.

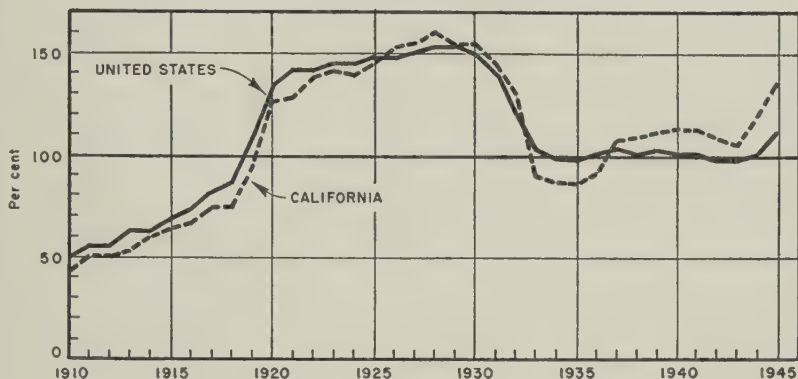


intelligently than during World War I: instead of purchasing land on credit, they have reduced their indebtedness.

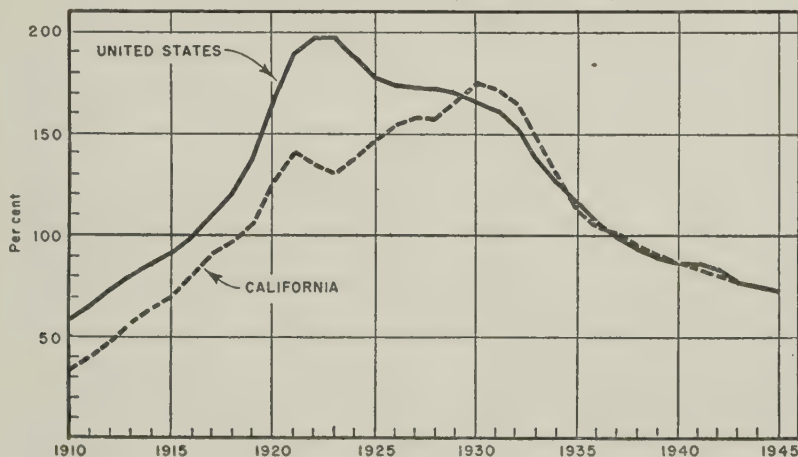
Thus, although price fluctuations appear in a farmer's production expenses and charges as well as in his income, the changes are not all of the same ampli-

FIG. 10. FIXED CHARGES

A, Taxes on Farm Real Estate Per Acre for California and the United States (1935 - 1939 = 100)



B, Interest Charges Payable on Outstanding Farm Mortgage Debt for California and the United States (1935 - 1939 = 100)



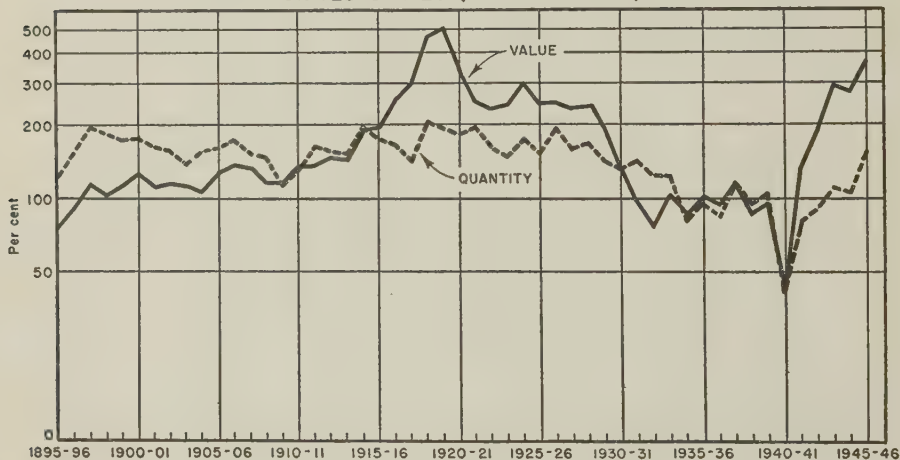
tude, nor do they all occur at the same time. These differences cause changes in his economic position in the course of a cycle. Hence the causes of price fluctuations are of fundamental interest to farmers. These causes will be explored in the following sections. It was shown in section 3 that production appears as a relatively unimportant factor in major fluctuations of cash farm income and agricultural prices, both in California and in the United States. As a next step in our analysis, therefore, we must turn to the demand side. First, we may ask how far changes in foreign demand may have been a factor.

## 5. FOREIGN DEMAND AS A FACTOR IN CHANGES OF CASH FARM INCOME

*Summary.* During the period surveyed, changes of foreign demand for agricultural exports were significant for changes of farm prices and cash farm income in the United States mainly because changes of foreign demand reinforced changes of domestic demand. Quantitatively, changes of foreign demand were less significant than changes of domestic demand.

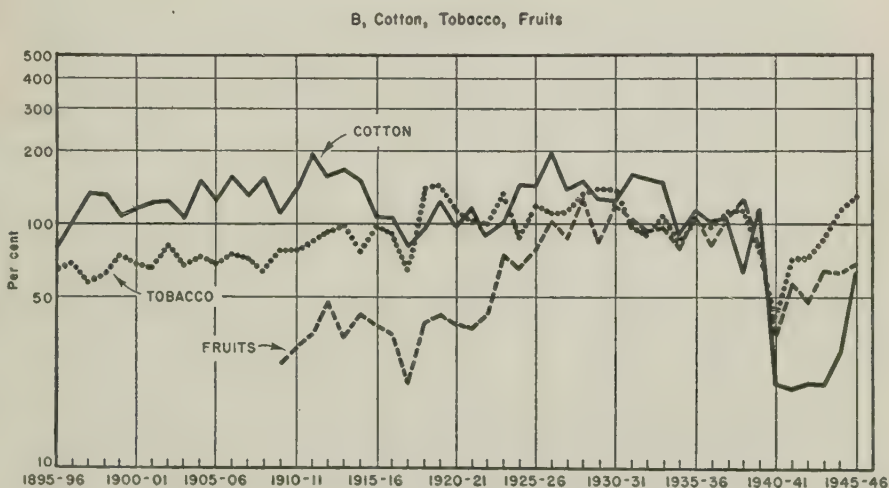
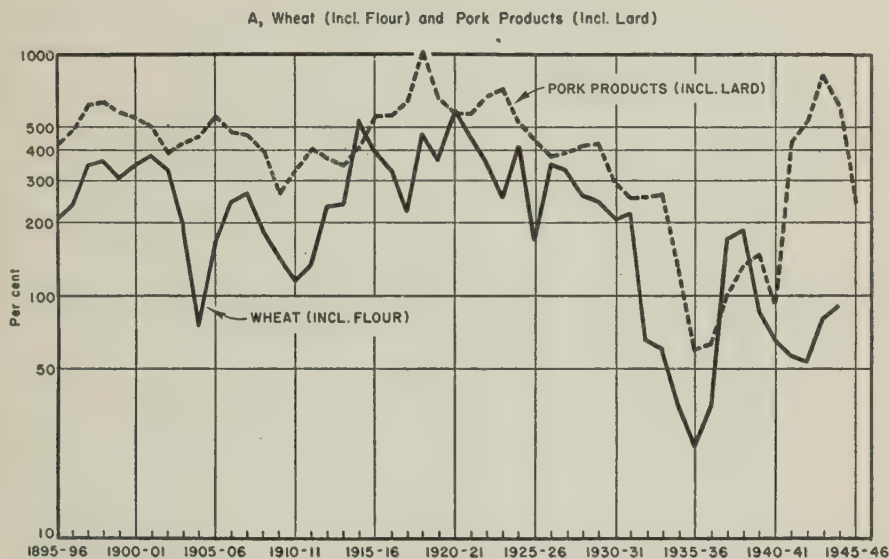
**Value and Quantity of Total Agricultural Exports.** Foreign-trade statistics make it possible to extend our period of analysis into the 1890's. Value and quantity of United States agricultural exports from 1895-96 to 1945-46 are shown in figure 11.

FIG. 11. VALUE AND QUANTITY OF DOMESTIC AGRICULTURAL EXPORTS, UNITED STATES (1935-1939=100)



From comparing the two series, the same conclusion comes to mind which was reached earlier from comparing cash farm income and quantities marketed: major fluctuations in the value of agricultural exports are more price than quantity phenomena. To be sure, quantity shows many oscillations; but these are relatively (compared with major fluctuations of value) short, and—at least, until the middle of the 1930's—they represent relatively small variations from a rather constant general level. This level, at around 150 (1935-1939 = 100), prevailed from 1895-96 to 1933-34. Changes of quantity in the same direction continued generally for not more than three years in succession and seldom reached 25 per cent of the level just mentioned. Value, on the other hand, shows changes in one direction of eight and ten years in succession; and variations (measured from the same level as that indicated for quantity) exceeded 200 per cent. Only between 1934-35 and 1940-41 did strong variations of quantity determine changes of value. The causes for these deviations of quantity were extreme harvest fluctuations in the United States

FIG. 12. QUANTITY OF DOMESTIC AGRICULTURAL EXPORTS BY MAJOR GROUPS OF COMMODITIES, UNITED STATES (1935-1939 = 100)



(largely effects of the drought in the middle of the 1930's) and the economic, political, and military difficulties of exporting to Europe in the beginning of World War II (in 1941, these difficulties were overcome by lend-lease and America's entry into the conflict).

**Quantity of Agricultural Exports by Major Groups of Commodities.** The quantity of agricultural exports warrants a more detailed examination by



major groups of commodities (fig. 12). These commodities represent about 90 per cent of United States agricultural exports. Two distinct patterns of behavior may be noted.

The first pattern (fig. 12, A) shows rather violent fluctuations. The major export commodities which show this pattern are wheat (including flour) and pork products (including lard). The latter may also be regarded as grain exports (mainly corn) in refined form. These groups of exports are greatly influenced by harvest fluctuations in the United States for two reasons: first, harvest fluctuations in grains are especially great; second, the export surplus is small in relation to total production. These groups of exports were also greatly affected by the two world wars: They are relatively cheap and concentrated sources of calories. They have, therefore, first priority for exports under conditions of shipping shortages during the war and of low foreign purchasing power during postwar readjustment.

The results of harvest fluctuations and of war obscure, but do not obliterate, a long-term downward tendency. This tendency, already noticeable during the fifteen years prior to World War I, was resumed in the beginning of the 1920's, and will, in all probability, reassert itself after the present postwar boom in exports has passed. The main cause for this long-term decline of exports was the expansion of the domestic demand in the United States, and the shifts in domestic production which took place under the stimulus of this expansion. This cause constitutes a permanent change in the structure of the American economy. Since the cause of the decrease in exports was an expansion of domestic demand, this decrease can scarcely be regarded as an important reason for declines of farm prices and of cash farm income. There is statistical confirmation for this opinion: The decrease in exports continued during the second half of the 1920's when farm prices and cash farm income were rising; again, the decrease was not especially great around 1920 and 1929 when major breaks in prices and cash farm income occurred.

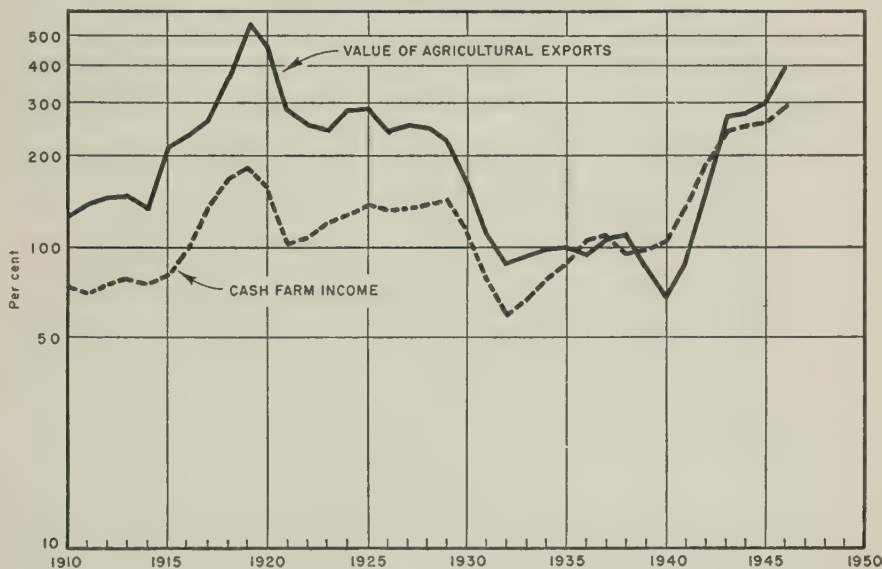
The second pattern does not show a long-term decrease (fig. 12, B). On the contrary, until the first half of the 1930's, the trend was upward. From then on, until the outbreak of World War II in 1939, exports were well maintained. The effects of the drought in 1934 and 1936 and of the two world wars are smaller than in the first pattern. Cotton, tobacco, and fruits exhibit this pattern. These are products in which the United States had large exportable surpluses in spite of harvest fluctuations and the expansion of the domestic market. This will probably apply also to the future if government policies, which artificially reduced exportable quantities and deliberately priced the American product out of world markets, are discontinued. These policies were particularly important for cotton. For the three commodities as a whole, however, there is no indication that changes of exported quantities were responsible for the major fluctuations of total value of agricultural exports observed above (fig. 11).

**Value of Agricultural Exports and Cash Farm Income.** Turning now to major fluctuations in the value (in contrast to quantity) of agricultural exports, a positive correlation with fluctuations of cash farm income exists (fig. 13). This was to be expected because, as already mentioned, fluctuations of both series are dominated by fluctuations of farm prices rather than quan-

tities. From this correlation far-reaching conclusions for the significance of agricultural exports for United States farmers have been drawn. The most clearly formulated example concludes a recent study of the U. S. Department of Commerce (1946) and may be quoted in full:

However, a change of one dollar in agricultural exports appears to effect an average change of approximately \$1.60 in cash farm income, on the basis of the long-term relationships described above. Part of the rise in income is attributable to the higher prices received for the reduced quantity of products sold in the domestic market. Since the domestic demand for most farm products is rather inelastic, a reduction in the available supply, such as that which takes place when exports expand, ordinarily results in a more than proportional rise in price. Similarly, any major decline in exports is likewise important.

FIG. 13. VALUE OF AGRICULTURAL EXPORTS AND TOTAL CASH FARM INCOME, UNITED STATES (1935 - 1939 = 100)



How far can this conclusion be accepted? In spite of the oversimplification involved, one may grant that the domestic demand for agricultural products as a whole is "rather inelastic" or, more precisely, that its price elasticity is smaller than unity over the relevant range. Likewise, within a short period—a year, for example—the total supply for domestic use and for export may be regarded as a fixed quantity or, at least, of small price elasticity. Under these assumptions any increase of demand, foreign or domestic, must lead to a considerable price increase in the domestic market.<sup>10</sup> Such effects should not be credited especially to an increase of foreign demand.

<sup>10</sup> The phrase "more than proportional rise in price" (used in the quotation above) is avoided because we are dealing here with increases of demand in the sense of upward shifts of the demand curve rather than movements along the "old" curve. It will be shown later that such shifts under the influence of changes of nonagricultural income and business activity are the essential problem in economic fluctuations. It cannot be assumed *per se* that the smaller the elasticity of the demand function, the greater the price rise from a given upward shift of the demand function.

Whether an increase of domestic prices (caused by an increase of foreign or domestic demand) leads to an increase of cash farm income depends on the price levels in the domestic and foreign markets and (if these levels are not identical) on the proportion of exports to total marketings. If the two price levels are identical, an increase in domestic prices must lead to an increase of cash farm income. As a special case, this situation may be assumed to have prevailed for agricultural export commodities during the period under consideration.

Nevertheless, there are two reasons why the proportion of the value of agricultural exports to cash farm income is significant for an analysis of the importance of foreign markets for United States farm products.

It was just indicated that, in principle and under the conditions specified, changes of domestic demand for agricultural products have the same importance for farm prices and incomes as changes of foreign demand. In actuality, effects depend on the magnitude of the changes and on the proportion of agricultural exports to total farm marketings. Changes of equal relative magnitude have much greater effects if they occur in domestic demand rather than in foreign demand. It is shown by the following data, giving the ratio of the value of domestic agricultural exports to total cash income from farm marketings in the United States,<sup>17</sup> that domestic demand has been of increasingly greater importance (in this sense).

Year	Per cent	Year	Per cent	Year	Per cent
1910.....	16.4	1922.....	21.9	1934.....	11.6
1911.....	18.5	1923.....	19.0	1935.....	10.5
1912.....	18.0	1924.....	20.6	1936.....	8.5
1913.....	17.9	1925.....	19.4	1937.....	9.0
1914.....	21.4	1926.....	17.2	1938.....	10.8
1915.....	25.1	1927.....	17.5	1939.....	8.3
1916.....	22.6	1928.....	16.8	1940.....	6.2
1917.....	18.4	1929.....	15.0	1941.....	6.0
1918.....	20.4	1930.....	13.3	1942.....	7.7
1919.....	28.0	1931.....	12.9	1943.....	10.7
1920.....	27.3	1932.....	13.9	1944.....	10.4
1921.....	25.9	1933.....	13.1	1945.....	10.9

These conclusions apply to American agriculture as a whole. For certain products—for example, cotton—the importance of foreign demand approaches that of domestic demand.

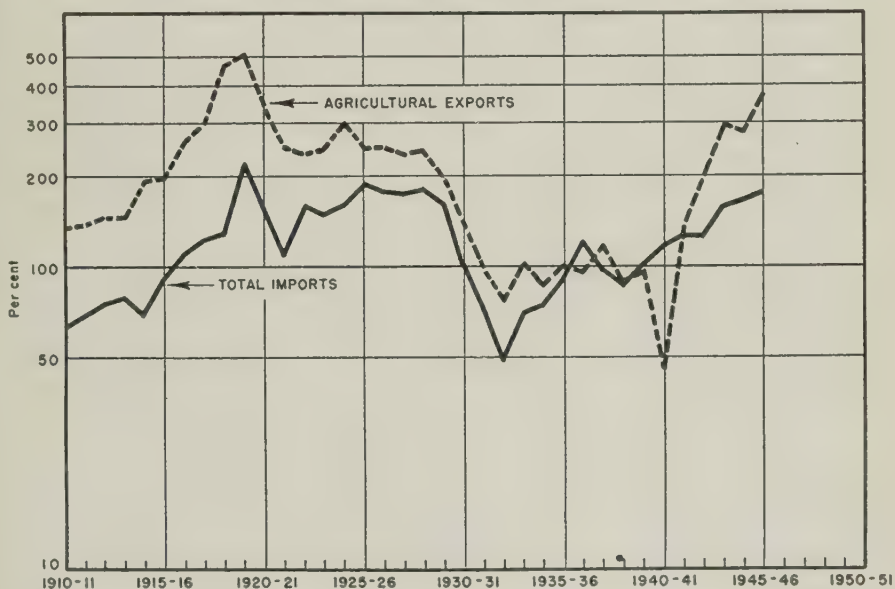
The proportion of agricultural exports to cash farm income has analytical significance also for a negative reason: explaining the regression coefficient of \$1.60 mentioned in the quotation above. If relatively small values (of agricultural exports) are correlated with relatively large ones (cash farm income) and the latter are regarded as a dependent variable, the regression coefficients must be larger than one dollar merely as a matter of statistical “mechanics.” The conclusion “a change of one dollar in agricultural exports appears to effect an average change of approximately \$1.60 in cash farm income” does not necessarily follow. This, at least, is true if the word “effect” is interpreted as indicating a cause-effect relation—as in the quotation.

<sup>17</sup> Although the proportion is shown in terms of value, it may also be interpreted in terms of quantity because the price factor is approximately the same for both series.



Besides the proportion of agricultural exports to cash farm income just considered, another factor points to the greater importance of domestic demand in interpreting the correlation shown in figure 13. Foreign demand for American agricultural products is determined by the availability of dollar exchange in foreign countries. In peacetime—that is, excluding war-related gifts called by whatever name (war loans, lend-lease, U.N.R.R.A. contributions, relief to liberated and occupied countries, reconstruction loans)—such availability is dependent upon American imports of foreign products and services. This dependence during the interwar period is shown in figure 14.

FIG. 14. VALUE OF AGRICULTURAL EXPORTS AND OF TOTAL IMPORTS, UNITED STATES (1935 - 1939 = 100)



The correlation would probably be even greater if imports of services could be considered. Unfortunately, reliable statistics on this point are not available.

United States demand for imports is determined by the same forces that determine domestic demand for United States agricultural products; these forces will be discussed in detail in following sections. During the interwar period, foreign and domestic demands for agricultural products were closely interrelated for this reason. During the two war periods, exports of United States agricultural products did not depend on United States imports. Still, foreign demand for agricultural products was related to domestic demand, because both were determined by the same international factor, namely, war needs.

On the basis of the theoretical considerations in the preceding paragraphs and of the earlier discussion of the behavior of export quantities (figs. 11 and 12), we may attempt to interpret the correlation shown between agricultural

exports and cash farm income (fig. 13). During the period surveyed, changes of foreign demand for agricultural exports were significant for changes of farm prices and cash farm income in the United States mainly because changes of foreign demand reinforced changes of domestic demand. During the last thirty-five years, agricultural exports have not been a stabilizing factor for the American agricultural economy—as is widely believed. Quantitatively, changes in agricultural exports were less important than changes of domestic demand. During the interwar period, changes of agricultural exports were largely the result of domestic changes of demand and supply. During the two war periods, changes of agricultural exports were the result of the same factors that caused changes of domestic demand. In general, analysis of agricultural exports as a factor affecting changes of cash farm income points to the importance of changes in domestic demand. This problem will be considered in the next section.

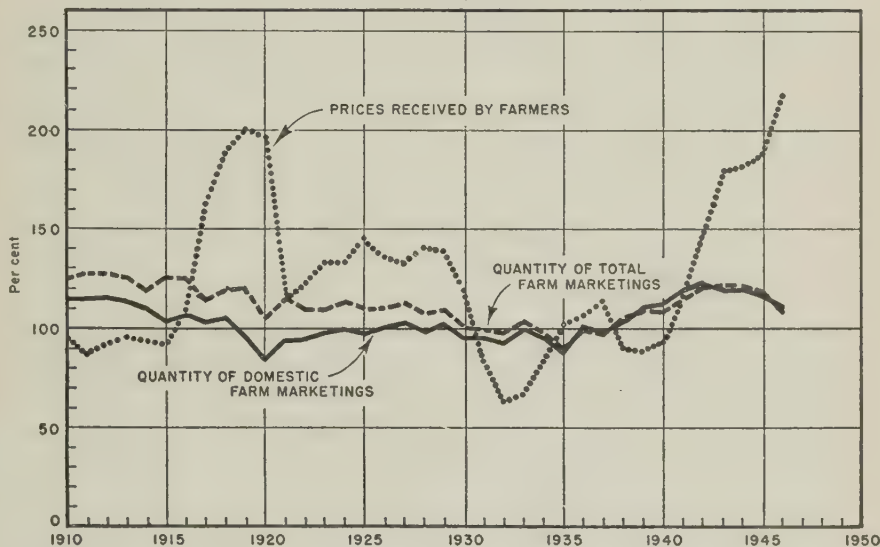
## 6. DOMESTIC DEMAND AS A FACTOR IN CHANGES OF CASH FARM INCOME

*Summary.* There is no indication that changes in number, composition, or diet of the nonagricultural population were responsible for major fluctuations in domestic cash farm income and agricultural prices. Changes in aggregate income of the nonagricultural population, especially of industrial workers, were highly correlated with fluctuations in agricultural prices and cash farm income. Other income factors—namely, changes in the proportion of income spent for agricultural products and changes in liquid funds—were either related to effects of changes in aggregate income or were of relatively small importance for the demand for agricultural products. But we cannot definitely conclude that fluctuations in aggregate income of nonagricultural population (especially of industrial workers) was the determining factor for fluctuations of agricultural prices. Income and price fluctuations may both be related to a common third factor or group of factors.

**Aspects of Domestic Demand.** Two aspects of domestic demand for farm products may be considered: the physical and the economic. The former includes number, composition, and diet of the nonagricultural population. The latter includes expenditures for farm products by final consumers and purchases by industry, processors, and traders. The various factors are inter-related. They may be treated separately, because they differ greatly in their importance for fluctuations of cash farm income and agricultural prices. Changes in number and composition of the nonagricultural population are small per year or even per decade and, except for the effects of economic fluctuations, are rather constant in direction. In diets, in consumer expenditures, and in purchases of nonagricultural industries, on the other hand, great changes may take place within a short period of time—a few months, for example—and the direction of these changes is rather variable.

**Number and Composition of the Nonagricultural Population.** Let us consider, first, the physical aspects of the domestic demand for farm products. In figure 15, quantities of total and of domestic farm marketings per person of the nonfarm population are compared with agricultural prices. Total quantities marketed per person of the nonfarm population decreased steadily until the middle of the 1930's. Domestically marketed quantities per person were maintained only because exports per person decreased. The decrease of exports, as we know, was largely confined to wheat and corn—the latter in the

FIG. 15. QUANTITY OF TOTAL AND OF DOMESTIC FARM MARKETINGS PER PERSON OF THE NON-FARM POPULATION AND PRICES RECEIVED BY FARMERS, UNITED STATES (1935 - 1939 = 100)



form of pork products (section 5). Since the middle of the 1930's, supplies per person increased gradually with rising prices.

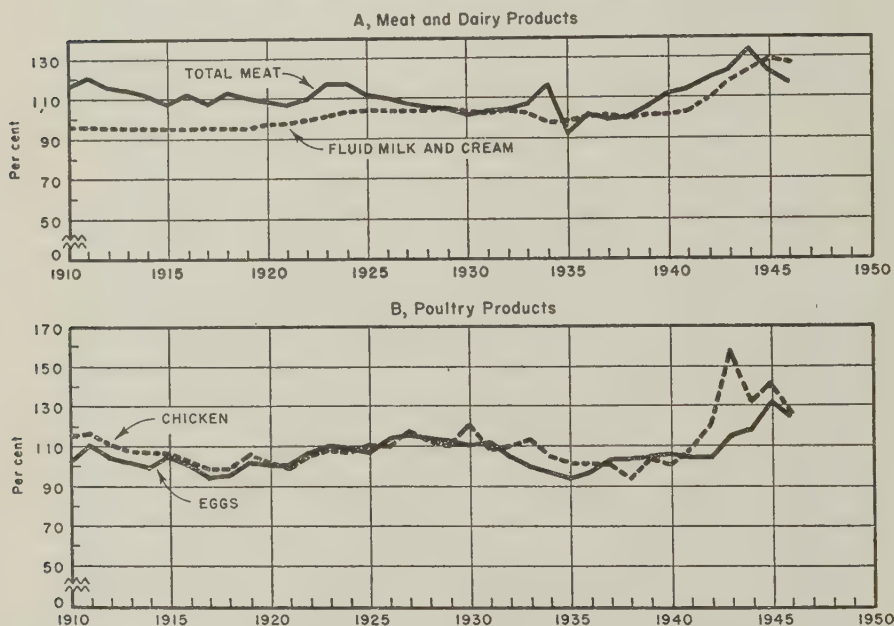
There is no indication that changes in prices were caused by changes in the supplies per person. On the contrary, some of the more important changes of quantities—for example, the decrease after 1929 and the increase since the middle of the 1930's—correspond in direction with changes of prices. This picture is not altered by taking into account changes in the composition of the nonagricultural population: during the period under review, especially during the "great depression" after 1929, the proportion of full consumers in the nonagricultural population increased.

**Diet.** The most significant aspects of changes of diets are changes in the consumption per person of animal products. Such changes alter the physical absorptive capacity per person for crops because of the great losses in feeding. These effects are taken into account in our quantity indices (fig. 15), only so far as grain and other crops are fed on the farm without market transactions. Some animal production is based on purchased feed. It is, therefore, necessary to review briefly changes in the consumption of animal products.



Figure 16 shows domestic consumption of total meat, fluid milk and cream, eggs, and chicken per person.<sup>18</sup> It is evident that changes in the domestic consumption of animal products per person were in the same direction as changes in total domestic farm marketings per person (fig. 15);<sup>19</sup> the amplitude of the former changes, especially the increase after the middle of the 1930's, was certainly not less (but possibly greater) than the amplitude of the latter changes. Variations in supplies per person for human consumption can, there-

FIG. 16. DOMESTIC CONSUMPTION PER PERSON: TOTAL MEAT, FLUID MILK AND CREAM, EGGS, AND CHICKEN, UNITED STATES (1935 - 1939 = 100)



fore, be no greater (but possibly may be less) than the small variations in domestic farm marketing per person shown in figure 15. In so far as shifts of consumption between crop and animal products in human consumption are not induced by income changes, they are a stabilizing influence in economic fluctuations. Such shifts act as a "buffer" in fluctuations of crop production. On the other hand, in so far as these shifts are induced by income changes, they

<sup>18</sup> For dairy and poultry products, consumption per person could only be shown for the civilian population. The increase in the consumption of animal products per person since 1941 would be considerably greater if military consumption had been included. Because of greatly increased military consumption of butter, cheese, and condensed and dried milk after 1941, and because of the strict rationing of these products for civilian consumption, total milk equivalent does not show the same strong increase as the other series. Civilian consumption of fluid milk and cream during this period is a better indication of actual changes in over-all (including military) consumption of dairy products than total milk equivalent.

<sup>19</sup> Total meat consumption shows the same strong increase after the middle of the 1930's as domestic consumption per person of dairy and poultry products. On the other hand, during 1933 and 1934, there is a sudden reversal of the downward trend when the other two series decreased further. This was caused by abnormally heavy slaughtering on account of the drought, accentuated by government programs,

tend to accentuate the income effects. During an upswing of income the increase in demand is especially great for animal products. This accentuates the increase in the over-all (including feed) demand for crops. During a downswing of income the opposite development takes place.

By some students the decrease of physical absorptive capacity for crops through replacement of farm draft animals by tractors has been regarded as a potent factor in creating agricultural "surpluses." It may be well, therefore, to point out that the great decrease of farm draft animals during our period of analysis and the corresponding release of crop production for human consumption is, for the purpose of this discussion, fully taken into account in our quantity indices of farm marketings (fig. 15): feed for farm draft animals is overwhelmingly home-produced.

**Three Income Factors.** Turning now to economic changes of domestic demand, three main factors are connected with income of final consumers. These factors are, first, changes of aggregate income; second, changes in the proportion of consumer income expended for agricultural products (the preceding factor being held constant); third, liquid funds in the hands of final consumers which may be increased or decreased to cushion income changes.

Among the three income factors, changes of aggregate income are by far the most important. Nevertheless, before these changes are discussed in detail, the other two factors deserve a general consideration.

**Income Distribution.** Changes in the proportion of income spent for agricultural products may be caused by changes in income distribution.<sup>20</sup> Studies of consumption show rather conclusively that the lower-income brackets have a higher income elasticity of demand for agricultural products (especially food) than the higher-income brackets (U. S. National Resources Committee, 1939—see part 2, sec. 6, for references to previous pertinent studies; U. S. Bureau of Home Economics, 1941a, 1941b, 1942; U. S. Bureau of Labor Statistics, 1941). However, changes in income distribution with constant aggregate income proceed rather gradually if revolutionary changes of economic institutions are excluded.<sup>21</sup> Changes of income distribution caused by changes of aggregate income in the course of economic fluctuations are likewise small, but probably accentuate the effects of changes in aggregate income upon cash farm income and agricultural prices.<sup>22</sup> As we shall see later, changes in aggre-

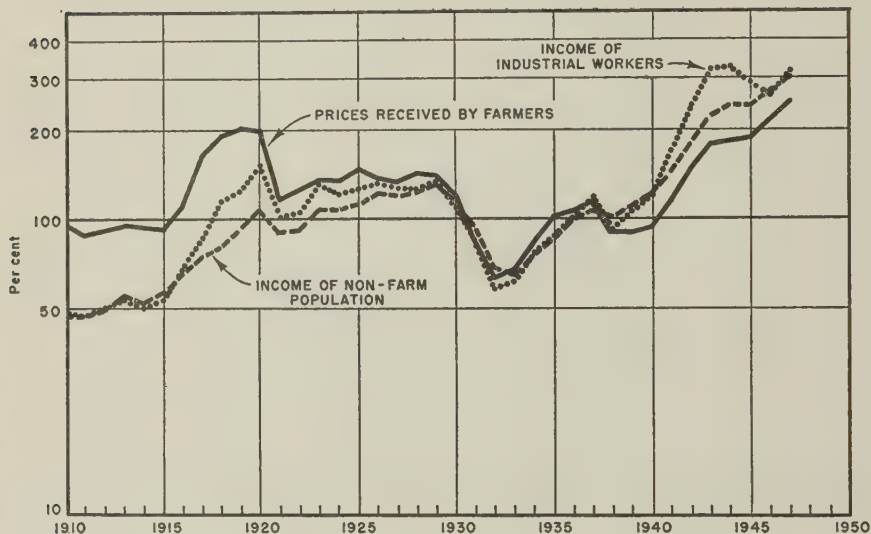
<sup>20</sup> Changes in the proportion of income spent for agricultural products may also be caused by changes of prices for reasons other than income changes. Price elasticity of the demand for agricultural products is frequently different from that of nonagricultural products. Likewise, governmental controls applied differently in degree to agricultural products and to products competing with agricultural products for the consumer's dollar (for example, durable consumer goods) may affect this proportion. We are not concerned here with these nonincome factors.

<sup>21</sup> Even great changes of economic institutions, provided they proceed gradually, have apparently small influence upon the income distribution. In Great Britain, for example, income distribution changed little between the Napoleonic Wars and the first world war in spite of the great impact of the industrial revolution.

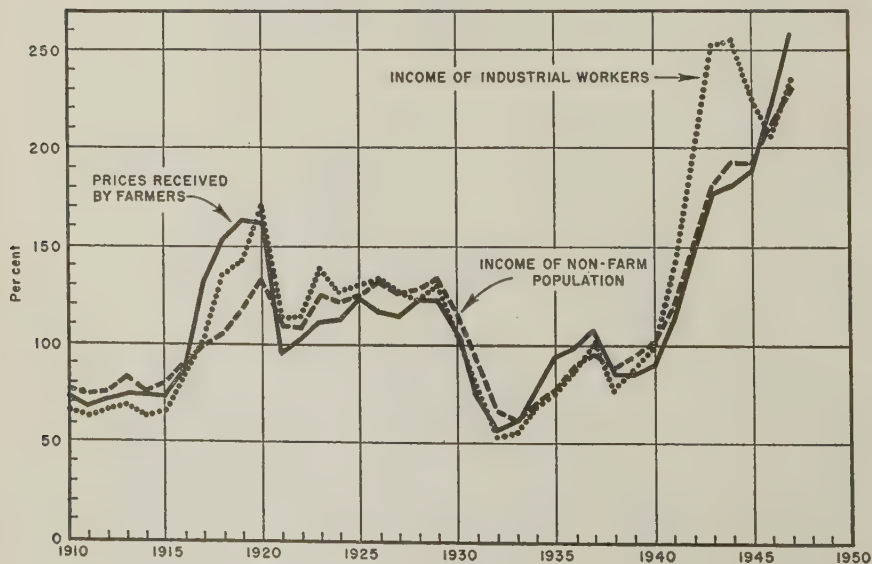
<sup>22</sup> By readers who are familiar with the concept of the "consumption function" it may be noted that the accentuating effect referred to in this paragraph does not necessarily contradict the dampening effects resulting from shifts of the consumption function during economic fluctuations and from changes of elasticity at different income levels (without shifts). However, nature and extent of shifts and changes of elasticity of the consumption function need more investigation before definite statements about them can be made. We shall return to these problems in the following section.

FIG. 17. PRICES RECEIVED BY FARMERS AND NONAGRICULTURAL INCOME, UNITED STATES

A, Prices Received by Farmers, Income of Industrial Workers, and Income of Non-Farm Population, United States (1935-1939=100)



B, Prices Received by Farmers, Income of Industrial Workers, and Income of Non-Farm Population, United States (Trend = 100)





gate income affect industrial workers more than the nonagricultural population as a whole (fig. 17). Wage earners, particularly unskilled and semiskilled industrial workers, comprise the lower-income brackets of the nonagricultural population.<sup>23</sup>

**Liquid Funds.** Changes in the accumulation of liquid funds influence the demand for agricultural products, but less than the demand for most non-agricultural products. Recent investigations have shown that accumulations of liquid funds are concentrated in the higher-income groups, and that the inequality in liquid-funds distribution is even greater than the inequality in income distribution (U. S. Bureau of Agricultural Economics, 1945-46). Since income elasticity of demand for agricultural products in the higher-income groups is small, it can be expected that "liquid-funds elasticity" of demand for agricultural products is even smaller. It may be well to mention that we are interested at this point in the "direct" relations between changes of liquid funds in the hands of final consumers and changes of demand for agricultural products. Changes in liquid funds (in the hands of final consumers and of others) may have significant relations with activity in nonagricultural industries and, through income, with demand for agricultural products. These "indirect" relations will be considered in the next section.

**Aggregate Income.** After this general appraisal of the two less important income factors, we may focus on changes of aggregate income. Since we know that, in agriculture, economic fluctuations are largely price and not quantity phenomena, we may compare prices received by farmers with the aggregate income of the nonagricultural population and of industrial workers (fig. 17). Because of relations already observed (fig. 5), this comparison applies also to cash farm income.

In contrast to prices received by farmers, the two income series show the same strong upward trend (fig. 17, A). Major fluctuations, however, are similar for all three series. This becomes especially clear after differences in trend are eliminated (fig. 17, B). Income of industrial workers shows the strongest fluctuations. Income of the nonagricultural population contains important items (income from salaries, rents, interest, professional services) which are less affected by changes in business activity than industrial payrolls.

About one third of the income of the nonagricultural population consists of income of industrial workers. If the latter were subtracted, income of the rest of the nonfarm population would show even greater stability. During the first world war and during the interwar period, fluctuations of farm prices corresponded more closely to fluctuations of industrial payrolls than to those of nonagricultural income as a whole. The same would probably have occurred during the second world war if farm prices had not been kept under government control. The effect of these controls requires some explanation.

In part, government controls merely obscured the influence of industrial payrolls upon farm prices: official price statistics do not sufficiently take

<sup>23</sup> Unfortunately, it is statistically not possible to study the income of unskilled and semiskilled industrial workers separately from that of skilled workers. The income of industrial workers shown in fig. 17 is largely earned by skilled workers (factory, mining, Class I railway employees). If this statistical difficulty could be overcome, differences in amplitude of income fluctuations would probably appear more pronounced.

account of black markets, upgrading, quality deterioration, and nonavailability of certain groups and grades of commodities. In part, however, government controls were effective in cushioning the full impact of the great increase of industrial payrolls upon farm prices. First, through various forms of subsidies, producers' and processors' incomes were increased without increasing farm and retail prices. Second, through rationing and price ceilings, the effect of increased payrolls upon both prices and producers' incomes was prevented, or—more correctly—delayed. The effect appeared when farm prices rose faster than industrial payrolls after government controls were released in the middle of 1946 (fig. 17, *B*). It is impossible to measure the influence of the foregoing factors accurately. All of them were especially important when most of the discrepancy between industrial payrolls and farm prices occurred, between 1943 and the first half of 1946.

The correspondence between fluctuations of prices received by farmers and our two indicators of nonagricultural income is rather close. In terms of relative deviations from trend, correlation coefficients between prices received by farmers, on one side, and income of industrial workers and of the nonagricultural population, on the other side, are 0.91 and 0.92 respectively for the period 1910–1946. The correspondence would be even closer if the effect of the other three income factors and of government controls could be measured more accurately. It is safe, then, to conclude that fluctuations of prices received by farmers and of cash farm income are mainly caused by fluctuations of nonagricultural income?

●

Investigation of nonagricultural income has led us very close to an explanation of fluctuations of farm prices, but there are two reasons why an affirmative answer to the last question needs some qualifications:

First, it was indicated above that many farm products are not bought with income of final consumers. Many agricultural products are industrial raw materials—for example, cotton, other fibers, hides, tobacco, and a considerable part of the grain and soybean crop. Industrial raw materials of agricultural origin are bought by business funds of industry and trade. Likewise, many agricultural products, other than industrial raw materials, are bought by funds of processors rather than final consumers. For storable products, changes of inventories in the hands of the trade are important. For products for which a market for futures exists, speculation may at times play a significant role. The period of manufacture and of processing, variations of inventories, and speculation in the market for futures may modify the effects of changes of final consumer's income upon agricultural prices and cash farm income. The question arises, therefore, whether business activity in these economic sectors is also determined by income of final (nonagricultural) consumers, or whether both are related to a third factor or group of factors. The correlations shown in figure 17 do not answer this question.

Second, farmers and policy makers cannot be satisfied with having fluctuations of agricultural prices explained by fluctuations of nonagricultural income. They will naturally ask: What causes fluctuations of nonagricultural income? An answer to this question will also provide answers to the preceding one. An attempt will be made to explore this problem in the next section.

## 7. FACTORS AFFECTING CHANGES OF NONAGRICULTURAL INCOME

*Summary.* Theoretical consideration of the processes of income formation in the modern economy point to an unbalance between saving and investment as the crucial factor affecting changes of nonagricultural income. An analysis of changes of saving and investment shows that changes of saving (and consumption) are income-induced and income stabilizing. Changes of investment, on the other hand, are to a large extent independent of income changes, are relatively more violent than changes in consumption, and are accentuated by secondary effects upon consumption and investment. Changes of investment, therefore, appear as a major cause of changes of nonagricultural income. Prices received by farmers are affected by changes of investment not only through nonagricultural income, but also directly through purchases of agricultural raw materials and changes of inventories. Changes of investment have also important effects upon total imports and through them upon exports of agricultural products. Changes of investment explain changes of domestic demand for agricultural products and also changes of foreign demand.

**Processes of Income Formation.** Changes of nonagricultural income and the causes of such changes belong to the most important aspects of the modern economy. An understanding of these aspects by farmers is essential for making proper decisions in their own business and, even more so, for taking part constructively in the formation of public economic policies. Before interpreting the available statistical data, it is necessary, therefore, to consider in general terms the processes of income formation in the modern economy.

To insure stability (see explanation in the next paragraph) over time of a given aggregate money income, of a given price level, and of a given employment level at given productivity of the working force, as much income must be returned to the income stream in each turnover period—for example, every three or four months, according to the income velocity of money—as was received in the previous period. Strictly speaking, employment and productivity involve three independent variables: first, the working force; second, the hours of work per man; and, third, the product per man-hour. For our purposes the latter two variables are included in productivity. For forecasting and for a definition of “full” employment, however, a clear differentiation between these three variables is necessary.

The foregoing statement requires an important qualification of what is meant by the term “stability”: in a growing economy, like that of the United States, the working force is increasing and so is its productivity, in spite of decreasing hours of work per person. Under these conditions, stability of money income per person, of the price level, and of employment (in the sense that involuntary unemployment remains unchanged) is insured only if increasing amounts of income are returned to the income stream in each turn-



over period. In other words, stability of income in terms of a rising trend (because of increases of the working force and its productivity) is under discussion. This trend is illustrated in figure 17, A. We could also express income in terms of wage units—as was done elegantly by Keynes (1936). However, such treatment of the growth factor obscures rather than elucidates some vital problems of economic stability.

A portion of income is collected as taxes and usually returned to the income stream through government expenditures.<sup>24</sup> By far the larger portion of the remaining (after taxes) income is returned to the income stream in the form of consumption. A relatively small portion is saved.<sup>25</sup> The crucial problem is what happens to these savings. If they are used by private industry or by the government and returned to the income stream as investment (to be explained presently), no diminution in this stream takes place. But if savings accumulate as idle balances in the hands of individuals, industry, banks, or government, the income stream is decreased. The decrease of income exercises pressure upon prices. If prices are flexible, a new equilibrium between the demand for idle balances and the demand for goods (consumption and investment) may be reached at a lower price level. At best, such an adjustment is slow and painful. If prices are not flexible—that is, if the economy adjusts to decreasing incomes largely through decreases of production rather than prices—a vicious circle is set in motion until saving is decreased in order to maintain consumption, or until investment increases.

**Meaning of Investment.** The term investment is used with many meanings in scientific as well as popular literature. With respect to income formation, investment means the expenditure of liquid funds (made available by current and accumulated saving and by the creation of “new” funds through the banking system)<sup>26</sup> for increases of inventories and for the production of durable goods. These goods are either producer durable goods—for example, factories, industrial equipment, irrigation systems, railroads; or government durable goods—for example, roads, dams, offices, and armaments; or consumer durable goods—for example, houses, automobiles, radios, and appliances.

Differentiation between investment in capital goods—that is, producer and government durable goods—and in consumer durable goods is desirable from the standpoint of income formation. It may be even argued that consumer durable goods are better excluded from a definition of investment. However,

<sup>24</sup> Tax-collected funds may be “saved” (see next footnote) by governments. Such action belongs logically in the field of fiscal policy to influence the income stream, and will be considered in section 9.

<sup>25</sup> In scientific usage, “saving” means the use of income for increasing money hoards, saving and checking accounts, for debt repayments, for payments of insurance premiums, and for the purchase of readily marketable securities. New debts and decrease of hoards, accounts, and security holdings are dissaving. In speaking about the economy as a whole, “net” saving (after taking account of dissaving) or “net” dissaving (after taking account of saving) is usually meant.

In this study saving is used in the “*ex ante*” (or “intended”) sense; this means that saving in one turnover period is compared with investment (see the definition in the text) in the succeeding period. It is believed that this use of the term facilitates an understanding of changes in the income stream from period to period. By some authors, saving is used in the “*ex post*” (or “statistical”) sense; this means that saving and investment are considered for the same turnover period. In this case saving is equal to investment by definition.

<sup>26</sup> The creation of “new” funds is mentioned separately from saving because they are not withdrawn from the income stream. Some authors include such funds in saving. Under the “*ex post*” definition of saving (see preceding footnote) this becomes necessary.

in a modern economy with increasing aggregate and individual importance of consumer durable goods, a clear differentiation between capital goods and consumer durable goods is practically and theoretically difficult. In many respects, consumer durable goods have characteristics similar to those of capital goods. They are purchased by accumulated rather than current saving, or on credit. Their purchase can be postponed over a considerable time. Processes and periods of production of consumer durable goods are similar to those of capital goods. Examples are houses and factories, automobiles and trucks, domestic appliances, and industrial equipment. On the other hand, investment in consumer durable goods is generally income-induced; whereas investment in capital goods is largely independent of income. Furthermore, fluctuations in durable consumer-goods industries—although more violent than fluctuations in the nondurable consumer-goods industries—are less violent than fluctuations in capital-goods industries; and, sometimes, the former lag behind the latter. For reasons which will become clear presently, independence from income is a major consideration for defining investment. On the basis of this consideration, and certain statistical ones explained later, consumer durable goods were excluded from our composite indicator of investment (p. 50).

The term may be used as gross investment if replacement and maintenance of existing durable goods are included, or as net investment if these items are excluded. In discussing economic fluctuations it is sometimes convenient to use investment in the former sense. In this case saving (and income) includes reserves for replacement and maintenance.

**Equilibrium between Investment and Saving.** We may say, then, that the essential problem of stabilizing the income stream from period to period is that the rate of investment be in equilibrium (balance) with the rate of saving. The term "is in equilibrium (balance)" instead of "is equal" is chosen because, as already emphasized, in a growing economy the investment rate must be larger than the saving rate in order to stabilize income per person and the levels of prices and employment. How much larger the investment rate must be depends on the rate of increase in the working force and its productivity.<sup>27</sup> Investment in producer durable goods itself is usually (but not necessarily) an important factor in increasing productivity.

If the investment rate is less than this equilibrium rate, an economic depression results: the income stream contracts, prices decrease, and involuntary unemployment increases. If prices are not flexible (see p. 44), and if no new external investment stimuli (see the next section) occur, contraction may continue until a certain "base level" of income and employment is reached. At this level, the unbalance between the rates of saving and of investment has disappeared through decrease of saving in order to maintain consumption.

If the rate of investment is greater than the equilibrium rate (because accumulated savings are drawn upon or funds newly created by the banking system are used), the income stream is increased. This increase leads to an increase in the stream of goods produced as long as there are unemployed resources and no serious bottlenecks. After full employment of resources is reached, any further excess of investment over its equilibrium rate leads to

<sup>27</sup> Habits of payments (income velocity of money) assumed to remain unchanged.

income and price inflation without increase in the real social product. Sooner or later a collapse of investment occurs because of stresses in the monetary system, distortions in the price structure, and because external investment stimuli have weakened.

The question may now be asked: Why does an unbalance between the rate of saving and of investment occur? First, we may consider the behavior of saving and, second, that of investment. For brevity's sake we shall henceforth speak of income, saving, consumption, and investment, although (if not otherwise indicated) rates per turnover period are meant.

**Significance of Saving.** In recent economic literature a great deal of attention is given to saving. It is frequently implied that saving, far from being a virtue, is actually an important contributing cause to economic fluctuations. Many economists believe that a decrease of saving in favor of consumption is the most important prerequisite for future stability of income in the American economy. How far can this view be accepted?

The proportion of income after taxes that is saved or consumed changes little spontaneously—that is, without changes of income (excluding the effects of forcibly deferred consumption during a war).

The influence of the rate of interest upon this proportion is frequently overestimated. This influence is small partly because other factors (habit, considerations of prestige and security) are more powerful than variations of interest rates, and partly because the reaction of different groups of savers to variations of interest rates is different in sign. Some groups save more when interest rates increase because the inducement to accumulate wealth for its own sake is greater or because (if savers are interest recipients) possibilities for such accumulations are greater. Other groups save less when interest rates increase because they save for a minimum future income; annuities and income-yielding assets become cheaper when interest rates increase. Likewise, the possibilities to save are curtailed through an increase of interest rates for those who are in debt.

In secular perspective, greater urbanization of the American economy tends to decrease the proportion of income saved: the propensity to save of the rural population is greater than that of the urban population of equal income status. (However, age distribution and size of family may be, at least partly, the cause of this difference rather than occupation and residence.) A greater proportion of older people in the population probably tends in the same direction. So does a greater equality in the income distribution. More complex changes are related to changes of taxation.

It was mentioned previously that the proportion of income (after taxes) saved changes under the influence of income changes. Such changes of saving as a function of income are considerable during cyclical (in contrast to secular)<sup>28</sup> changes of income (fig. 18).<sup>29</sup> With increasing income, during eco-

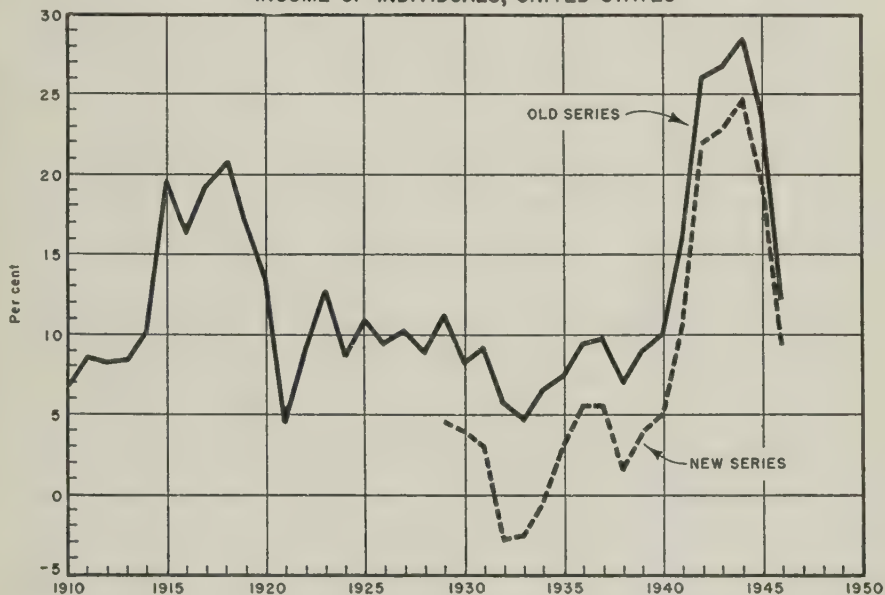
<sup>28</sup> Much of the confusion in present economic theory about the constancy of the "consumption function" is caused through lack of clarity in differentiating between secular and cyclical changes.

<sup>29</sup> The new series for income and consumption is not available before 1929. For this reason the old series is also presented. In the new series, savings are considerably smaller than previously estimated. However, cyclical fluctuations of the ratio of saving to income are as great (if not greater) in the new series as in the old. These fluctuations, rather than the magnitude of the ratio, are relevant for the argument presented in the text.



economic fluctuations, the proportion of income saved tends to increase, and with decreasing income to decrease. These effects are especially great in the beginning of income changes, before new consumption patterns based on the new income level are established. During the two war periods, saving was increased not only because of increases of income, but also because of limited availability of civilian consumption goods—especially durable goods. As a corollary, during the early postwar periods, saving (current saving as well as liquid funds accumulated through wartime saving) was decreased to satisfy deferred demand after government controls were removed.

FIG. 18. NET SAVING OF INDIVIDUALS IN PER CENT OF DISPOSABLE INCOME OF INDIVIDUALS, UNITED STATES

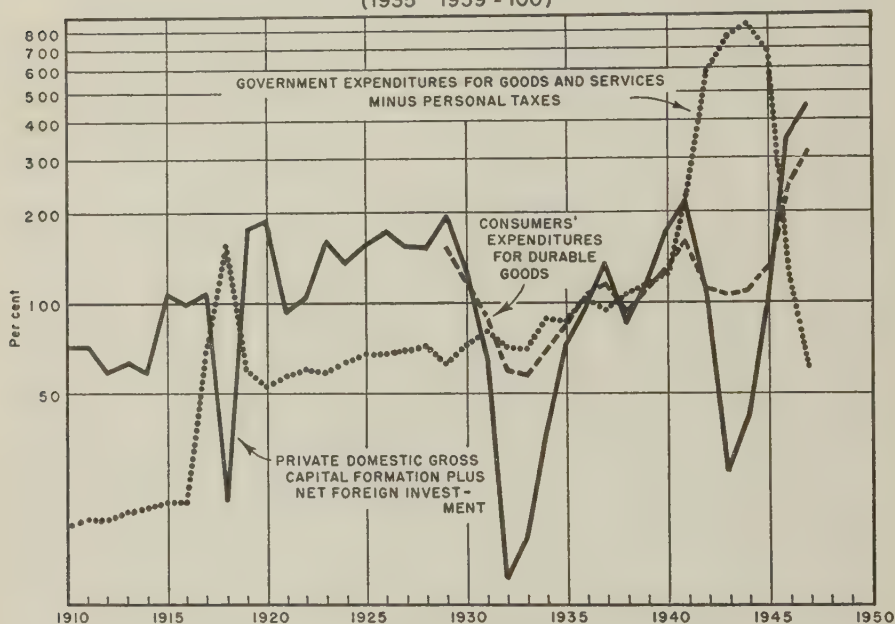


From figure 18 we may conclude that quantitatively significant cyclical changes in the proportion of income saved have been an important stabilizing factor in economic fluctuations. If these changes of saving had not occurred, fluctuations of income and prices would have been more severe. The fact that cyclical changes of saving are not only income-induced, but that the direction of these changes is income stabilizing, makes saving (or consumption) a logically and empirically unsuitable point of departure for an explanation of the cause of income fluctuations. Our attention, therefore, must be focused on changes of investment.

**Significance of Investment.** Changes of investment are of paramount analytical significance for explaining income changes for three reasons: First, changes of investment may take place spontaneously—that is, they need not be induced by income changes—as are saving and consumption. Second, percentage changes of investment are violent—much more so than percentage changes of consumption. Third, changes of investment are accentuated by sec-

ondary changes of consumption and investment.<sup>30</sup> Secondary effects upon consumption occur through expenditures of the workers employed in the investment-good industries. Secondary effects upon investment may occur because a large percentage increase in some investment-goods industries requires investment in others. For example, an increase of investment in construction might bring about an increase of investment in industries producing raw materials and machinery used in construction. In contrast, changes of consumption usually do not lead to large secondary effects because, relatively,

FIG. 19. INDICATORS OF INVESTMENT, UNITED STATES  
(1935 - 1939 = 100)



even large absolute changes of consumption are small. Such small percentage changes do not require changes of investment in the consumption-goods industries or in the industries producing raw materials for them.

**Indicators of Investment.** For testing statistically the above reasoning about the processes of income formation in the modern economy, we may differentiate between three indicators of investment (fig. 19): (1) government expenditures for goods and services, minus personal taxes, (2) private domestic gross capital formation, plus net foreign investment, and (3) consumer's expenditures for durable goods. None of these indicators is quite satisfactory in the light of our previous explanation of the meaning of investment. A short discussion of the three series is, therefore, necessary.

Government expenditures for goods and services include items—for example, salaries for the regular civil service—which are not investment. Data

<sup>30</sup> By some authors these secondary effects of a given investment are called "multiplier effects" as far as consumption is affected and "acceleration effects" as far as investment is affected. The many intricate and controversial aspects of the "multiplier" and the "acceleration" principle need not be discussed here.

are not available to permit separation of such items from investment, such as public construction and armaments. On the other hand, during the two war periods, government expenditures for construction and armaments dominated total investment—that is, public plus private investment. It is not possible, therefore, to disregard government expenditures altogether. The weight of the noninvestment items in our analysis will be kept relatively small for the following reasons: From the standpoint of income formation, that portion of government expenditures for goods and services is of particular interest, that exceeds receipts from personal taxes. We are deducting, therefore, personal taxes from government expenditures for goods and services. The increase of personal taxes reflects fairly well the long-time increase of the noninvestment items in government expenditures. Furthermore, we will be dealing with deviations from trend. The noninvestment items are responsible largely for the upward trend rather than for the fluctuations of government expenditures.

At first glance it appears strange to regard armament expenditures as investment. Suppose, however, we discard the notion that investment must necessarily create productive capital goods—a notion by no means always justified in peaceful lines of investment. At least in the short run, public investment in armaments and private investment in capital goods have the same economic effects. In the long run, as already mentioned, investment in capital goods leads usually (but not necessarily) to increases in productivity. However, under certain conditions, this may be true also for investment in armaments. The quantitative effects upon income formation are generally much greater for changes of investment in armaments than for changes of investment in productive capital goods.

Private domestic gross capital formation plus net foreign investment includes: (1) construction, (2) producer's durable equipment, (3) changes in inventories, (4) net exports of goods and services, and (5) net exports and monetary use of gold and silver. A further breakdown and adjustment of the last two items would be desirable to make the aggregate satisfactory for our analysis. This proved statistically impossible.<sup>31</sup> However, this shortcoming is rather insignificant because the relative weight of the last two items in the aggregate is small.

The upward trend in private gross capital formation (including net foreign investment) appears weaker than in government expenditures. To be sure, conclusions with respect to the slope of this trend are somewhat hazardous because statistical data before the 1920's are unsatisfactory, and because, since that time, violent fluctuations dominate the scene. Still, there appears no contradiction for the opinion of those who fear that in secular perspective government expenditures may have to be increasingly relied upon to balance (in the defined sense) the upward trend in the amount of saving indicated above.

Consumer expenditures for durable goods are a less adequate indicator of investment than the production of durable consumer goods. The bias introduced is more one of timing, however, and is not likely to be material. Fluc-

<sup>31</sup> As mentioned previously, the old series of national income and product statistics were used before 1929. These series were linked to the new series (available only after 1929) on the basis of their relation from 1929 to 1939.



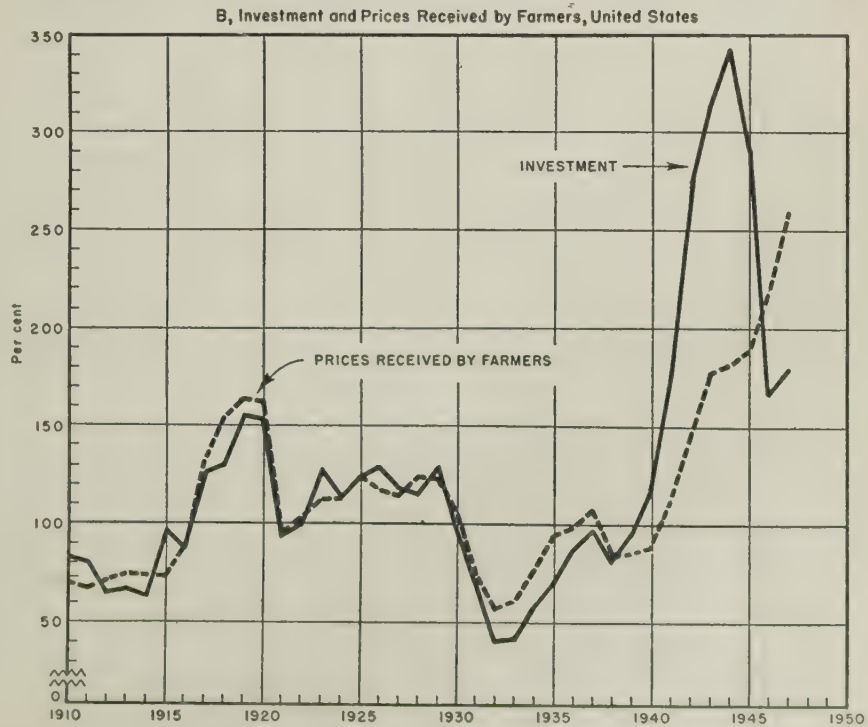
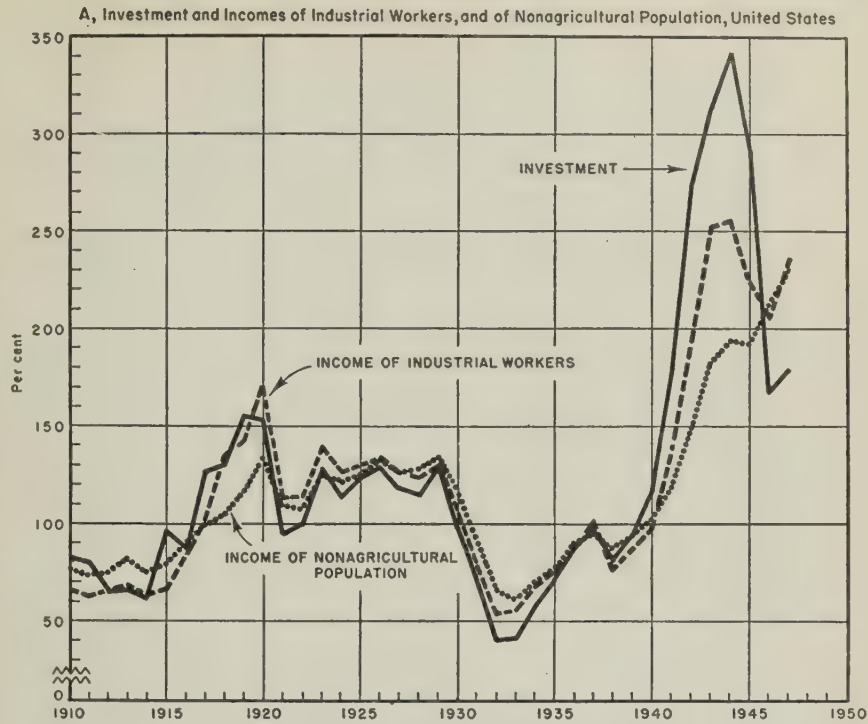
tuations in consumer expenditures for durable goods are less violent than fluctuations in private gross capital formation and sometimes—for example, in 1932 and 1933—lag behind them (fig. 19). Statistically the series is available only since 1929. For this reason and because of the theoretical considerations presented above, it was not included in our composite indicator of investment. A test for the period after 1929 indicated that this exclusion did not materially affect such an indicator.

The question may be raised whether our composite indicator of investment (government expenditures for goods and services, minus personal taxes, plus private domestic gross capital formation, plus net foreign investment) is significant, or whether an indicator of the saving-investment balance would be more appropriate in the light of our previous discussion. The latter indicator can be obtained by deducting personal savings, undistributed corporate profits, and contributions to social security funds from the former indicator. After studying such an indicator of the saving-investment balance in some detail, it was rejected for the following reasons: statistically, the above saving items are not reliable (some of them are computed as residuals) and their definition does not correspond to that of saving in economic theory. More importantly, cyclical variations of personal savings are, as we know, induced by variations of income. Although secular changes of personal savings are, at least in the opinion of many students, independent of income, the evidence on this point is insufficient. Similarly, cyclical variations of corporate saving (that is, undistributed corporate profits) are, partly at least, induced by variations of investment. A theoretical and statistical isolation of these variations from those which are independent of investment proved impossible on the basis of available data. As one would expect, the indicator of the saving-investment balance lagged behind the indicator of investment and showed a considerably smaller amplitude of fluctuations.

**Investment and Income.** Changes of investment are highly correlated with changes of income (fig. 20, *A*). This correlation is especially high for income of industrial workers. Industrial workers are affected more by changes in the investment-goods industries than the salaried and proprietary groups of the non-agricultural population. For the period 1910 to 1946, the correlation coefficient between fluctuations of investment and those of income of industrial workers was 0.97, and between investment and income of the nonagricultural population, 0.92. The statistical evidence, then, is in fairly good agreement with our thesis that changes of nonagricultural income are primarily caused by changes of investment.

**Investment and Farm Prices.** In view of these findings, it is not surprising that the correlation between fluctuations of investment and of prices received by farmers is also close (fig. 20, *B*). Before price control, rationing, and subsidies kept agricultural prices under control during and after World War II, this correlation was even closer than the correlation between income and prices (compare fig. 20, *B*, with 17, *B*). As already indicated, price control, rationing, and subsidies obscured and delayed, rather than prevented, the impact of investment and industrial workers' income upon farm prices. The discrepancy between our indicator of investment and farm prices is especially great between 1943 and the first half of 1946. Reasons were given (page 42)

FIG. 20. INVESTMENT, NONAGRICULTURAL INCOME, AND FARM PRICES, UNITED STATES  
(TREND = 100)



why, during this period, official price statistics are a poor indicator of the effects of investment fluctuations. If this is taken into account, the statistical evidence is in agreement with the thesis advanced in the preceding section—namely, that many farm products are affected by business activity directly through raw-material purchases and changes of inventories, besides indirectly through nonagricultural income. Investment affects agricultural prices in both ways.

**Investment and Foreign Trade.** Finally, we may call attention to the relations between fluctuations of investment and fluctuations of foreign trade (section 5). During the interwar period, agricultural exports were closely related to total imports as the main source of foreign purchasing power. Total imports, in turn, are a function of domestic investment, first, directly through raw-material imports by the investment-goods industries, and second, indirectly through income—that is, through imports of raw materials for the consumption-goods industries and through imports of finished luxuries. During the two war periods the close relation between agricultural exports and total imports was broken because special credit arrangements and outright gifts made foreign countries independent of the dollars obtained through United States imports. Still, during these periods the increase of agricultural exports was caused by the same forces—namely, war needs—that caused the increase of domestic investment and income. It is clear now why (as we found in section 5) changes of foreign demand for agricultural products reinforced changes of domestic demand.

In principle, investment fluctuations in foreign countries should also be considered. Practically, for the purpose of this study, this is not essential for three reasons. First, historically speaking, investment fluctuations in industrial countries, which buy the bulk of United States agricultural exports, have been similar to those of the United States:<sup>32</sup> changes in internal conditions and external stimuli for investment have generally been international. Second, viewing the future, the weight of the United States economy among the trading nations is so great that international fluctuations of investment are dominated by those in the United States. Third, from the standpoint of agricultural policy in the United States, farm prices and incomes may be shielded relatively cheaply against repercussion of investment fluctuations in foreign countries, because of the much greater relative importance of the domestic market for United States agriculture (section 5); the same reason makes it very costly and politically difficult to shield farm prices and incomes against the effects of investment fluctuations in the United States.

Thus we have seen that unbalance between saving and investment is responsible for changes of nonagricultural income; and that in this unbalance investment changes are the causal factor. Since investment is so important for nonagricultural income, and hence for farm prices, we must ask what factors cause changes of investment.

<sup>32</sup> The qualification excludes the U. S. S. R., where investment fluctuations have been of a different nature since World War I. Since 1933, investment fluctuations in Germany have also been different, but the importance of Germany as a market for the agricultural exports of the United States has been relatively small since then.



## 8. FACTORS AFFECTING CHANGES OF INVESTMENT, AND THE ROLE OF MONEY

*Summary.* In contrast to agriculture, fluctuations in the investment-goods industries are quantity rather than price phenomena: changes of investment are "real" changes of production and employment. These changes are influenced by two sets of factors which may be called internal conditions and external stimuli, respectively. In principle, both sets of factors are of equal importance for investment fluctuations. Historically speaking, the strength of external stimuli was the essential factor for duration and amplitude of investment fluctuations. Among important external stimuli—for example, technological changes, discovery of new stocks of resources and, especially, war, preparation for war, and postwar reconstruction—monetary factors play a relatively minor role. In investment and price fluctuations, as a whole, money can generally be regarded as a dependent rather than an independent variable.

**Quantity and Value of Investment.** Investment is defined in terms of value, and the statistics presented in the preceding section dealt with value and not with quantity of investment. It may be well, therefore, to point out that fluctuations of investment are quantity rather than price phenomena (fig. 21).<sup>33</sup> Statistics on value of investment, therefore, are also an indication of its quantity. The contrast with the situation in agriculture is striking. As pointed out in section 3, little remains of economic fluctuations in agriculture if the money "veil" is taken off (compare fig. 1 with fig. 6). In investment, on the other hand, economic fluctuations are "real" in the sense that fluctuations of quantity are far more violent than fluctuations of price. As a corollary, cyclical changes of employment occur mainly in the investment-goods industries rather than in agriculture and the consumption-goods industries. We may conclude then that the value of investment is changed because of factors other than the mere change of money funds available for investment. What are such factors?

**Factors Affecting Changes of Investment.** The rate of investment is determined by two sets of factors. There are, first, certain *internal conditions* in the economic system itself which are favorable or unfavorable to investment—for example, interest rates, wage rates, prices of raw materials, and replacement and maintenance needs for durable goods.

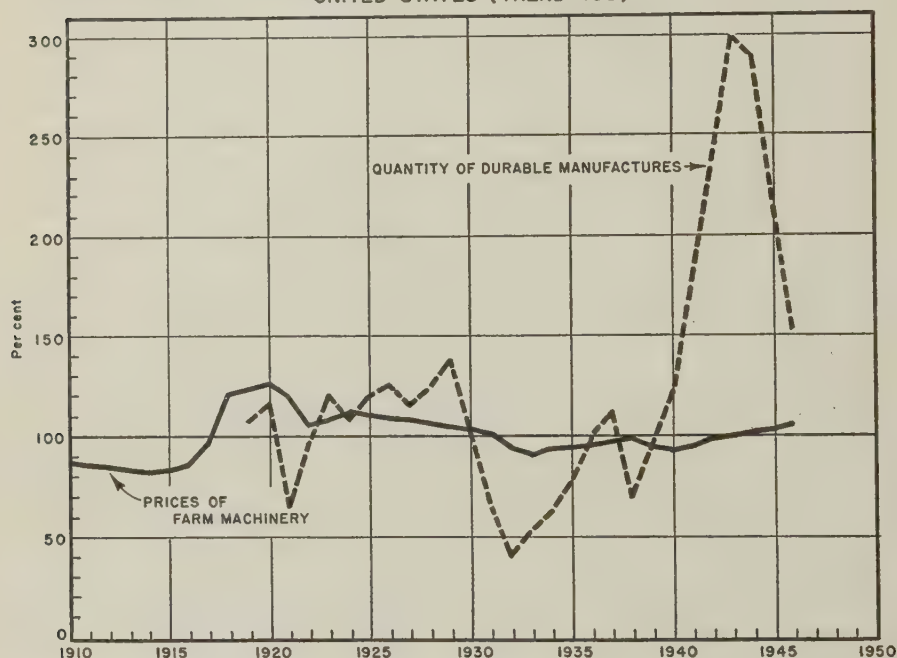
The influence of the rate of interest upon investment is probably greater than the influence upon saving considered above (section 7). However, the influence upon investment is also frequently overestimated. Investors commonly make plans for relatively short periods, let us say for less than ten years. Within such periods, problems of technological obsolescence and other uncertainties are usually more important than interest rates. In the internal

<sup>33</sup> A price index of total durable manufactures which could be compared with our quantity index of durable manufactures is not available. We have used, for comparison, prices of that group of durable manufactures in which farmers are especially interested, namely, farm machinery (see also fig. 9, B). Prices of other durable manufactures—as far as they are available—show a similar rigidity.

investment of corporations, interest is imputed but not actually paid out and need not be considered as a factor affecting financial liquidity. Under these conditions, size, prestige, and security of the corporation may become more important considerations for the investment decisions by the management than profitability for stockholders.

The influence of wage rates upon investment is a controversial subject in economic theory. In classical economic theory the responsiveness of investment to variations of wage rates (the elasticity of the demand for labor) plays

FIG. 21. QUANTITY OF DURABLE MANUFACTURES AND PRICES OF FARM MACHINERY, UNITED STATES (TREND=100)



an important role. In recent economic literature the lack of responsiveness is generally stressed. Both points of view may be justified: there are reasons for believing that the responsiveness of investment to variations of wage rates may change (shift) in the course of economic fluctuations. Such a situation makes statistical verification highly difficult. A similar statement holds for the influence of raw-material prices upon investment.

There are, second, *external stimuli* to invest. These may change (independently of changes of internal conditions) the profitability of private investment, or they may consist of circumstances that induce the public to invest irrespective of whether the profitability of private investment has changed.<sup>84</sup> Examples of external stimuli are technological changes, discovery of new stocks of resources (among them monetary metals), natural phenomena (harvests, livestock cycles, catastrophies), political changes (affecting eco-

<sup>84</sup> This rather general formulation is used in order to avoid such academic terms as "marginal private productivity of entrepreneurial investment" and "marginal social productivity of public investment."

economic institutions, opening or closing of foreign markets, security of internal and external private investment, and so on) and, finally, stimuli for public investment (peaceful public works, war, preparation for war, and postwar reconstruction).

In principle, internal conditions and external stimuli are of equal importance for investment fluctuations, although in a given historical situation their relative importance may differ greatly. A theoretical explanation of economic fluctuation as a whole based on only one or the other set of factors is not possible. Historically speaking, the essential factor for duration and amplitude of investment fluctuations was the strength of external stimuli. Some external stimuli are always present in a dynamic society. If they are not especially strong, an internal change of sensitivity of the economic system to these stimuli becomes a conditional prerequisite for changes of investment. Changes of internal conditions take place automatically in the course of investment fluctuations. A deficit of investment (in the sense explained in the preceding section), if continued over a sufficient period of time, changes internal conditions so that investment becomes more sensitive to external investment stimuli. A deficit of saving has the opposite effect upon internal conditions. On the other hand, if external stimuli are very strong, investment activity may continue at a high level even though internal conditions have become increasingly unfavorable. In such a situation, contraction of investment activity is usually very severe after external stimuli have weakened.

A detailed analytical and historical discussion of internal conditions and external stimuli is beyond the scope of the present study.<sup>85</sup> Among internal conditions, changes of price relations probably rank first. The most important external stimuli are technological changes, discovery of new stocks of resources and, especially, war, preparation for war, and postwar reconstruction.

**Role of Money.** The role of another factor may be explored here somewhat further, because throughout the history of the United States it has attracted the interest of farmers as an explanation and as a remedy for fluctuations of agricultural prices. This factor is the monetary system and, especially, the quantity of money. Money may have effects upon prices. These effects are taken into account under internal conditions and external stimuli for investment.

Among internal conditions of investment, the quantity of money is most directly related to credit conditions—that is, to the interest rate and credit rationing. Such effects of changes in the quantity of money upon investment should not be overestimated for two reasons: First, factors other than changes of interest rates are usually more powerful in altering the profitability of private investment.<sup>86</sup> Second, at low interest rates, as at present, an increase (but not necessarily a decrease) in the quantity of money has little effect upon interest rates. At low interest other internal conditions for investment—for example, wage rates and raw material prices—become relatively more important for investment than interest rates.

The negative functional relation between quantity of money and interest rates is a curve that flattens out at low interest rates. The reason is as follows: Interest rates are gross rates which include allowances for risk, uncertainty,

<sup>85</sup> For a detailed analytical and historical discussion of the interrelation between the two sets of factors, see Ciriacy-Wantrup (1936, 1938a, 1938b).

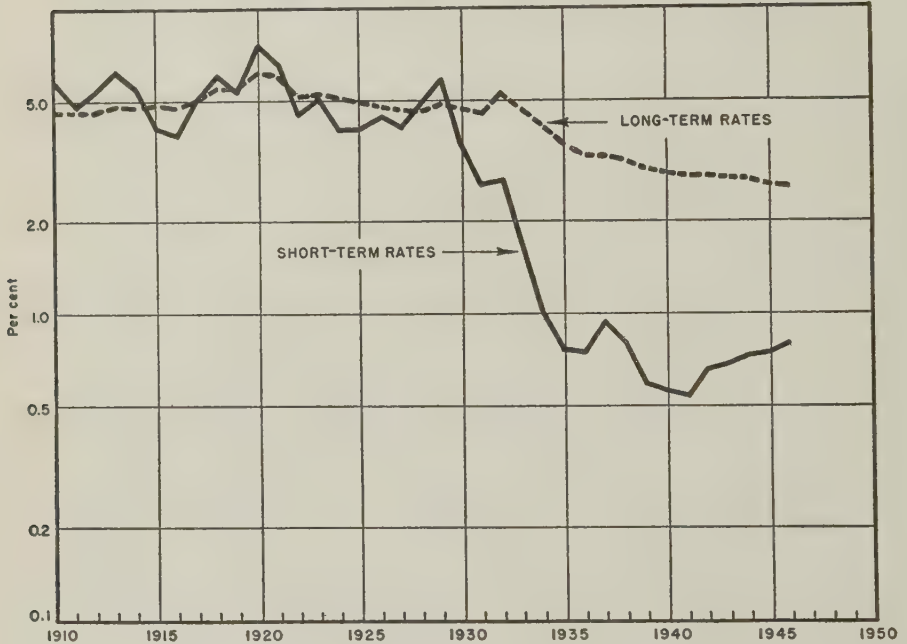
<sup>86</sup> For a historical analysis of this point, see the literature cited in the preceding footnote.



costs of lending, and income taxes. If the minimum gross rate represented by these items is approached, an increase of loanable funds through credit creation does not decrease the rate further. The minimum gross rate differs for long-term and short-term loans, as illustrated by figure 22.

Among external stimuli of investment, the purchasing power of monetary-metal producers is, at present at least, small in relation to others—namely, the pent-up domestic demand for consumer and producer durable goods, foreign needs for relief and rehabilitation, and continuing requirements of the military establishment.

FIG. 22. SHORT-TERM AND LONG-TERM INTEREST RATES, UNITED STATES



More important than the cause-effect relations just discussed is the opposite one: in a correlation with investment and prices, the quantity of money must generally be regarded as a dependent rather than an independent variable. This is quite obvious for bank money in a monetary system like that of the United States. Within the wide and flexible limits of reserve requirements,<sup>87</sup> money can be readily created and canceled in response to fluctuations in demand for money to finance investment. This is especially true when the demand for money originates from the investment needs of the government. In this case, reserve requirements become largely nominal. In the field of public policies, effective action with respect to economic fluctuations requires a combination of monetary and fiscal measures, especially the latter (section 9).

Dependence of the quantity of money on investment and prices is not confined to bank money, but occurs also in the production of monetary metals.

<sup>87</sup> These requirements are flexible because of actual changes in the requirements and because of open-market operations of the Federal Reserve System.

First, given certain technical possibilities of production and prospecting, the actual rate of gold and silver production is influenced strongly by the prices of productive services used. Second, money metals are to some extent joint products with other metals—for example, copper—which are important raw materials for the durable-goods industries; fluctuations in the production of durable goods, therefore, also lead to fluctuations in the production of money metals. Third, external stimuli to invest—for example, technological advances in metallurgy, opening and closing of foreign markets, wars—may also have important effects upon the production and distribution of monetary metals.

The foregoing hypothesis about the cause and effect relations between investment and prices, on one side, and the quantity of money, on the other, may now be compared with available data. Fluctuations of the quantity of money may be correlated with fluctuations of investment (fig. 23, *A*) and of prices received by farmers (fig. 23, *B*).<sup>38</sup> Fluctuations of the quantity of money were less pronounced than fluctuations of investment and farm prices, and at some important turning points lagged behind them. Annual data are inadequate for an analysis of turning points. This problem, therefore, was investigated on the basis of monthly and quarterly data as far as available. In 1915, 1919, 1921, 1929, and 1933 the movements of investment and of seasonally adjusted prices received by farmers (and of wholesale prices) preceded movements in the quantity of money. The same holds true for production and employment, although data in these fields are inadequate. During the less important turning points in 1937 and 1938, prices lagged. In these years, however, harvest fluctuations and the foreign political situation created rather erratic movements. Thus, statistical data do not point to fluctuations in the quantity of money as playing a primary initiating role in fluctuations of investment and farm prices.

It may be objected that, before drawing this conclusion, we should consider not only the quantity of money, but also the velocity of its circulation. Small analytical significance attaches to any explanation of price fluctuations through velocity of money. Velocity merely becomes a catch-all for internal conditions and external stimuli of investment and for other factors which themselves remain in the dark. Aside from this objection, recent statistical studies (Warburton, 1945; Fisher, 1945) seem to indicate that income velocity of circulation (after correction for its downward trend, after statistical adjustments, and after excluding "speculative" transactions and the last extreme stages of inflation as in central Europe after World War I) is rather stable instead of very unstable, as commonly imagined.

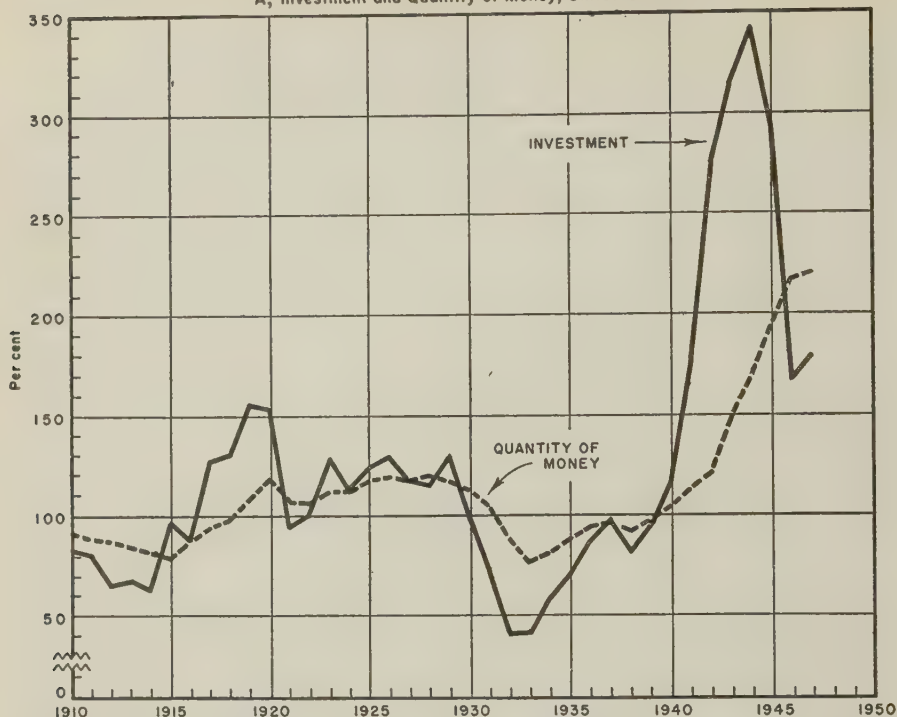


What significance do these findings have for public policy and private action? At what stage or stages in this chain of relations between internal conditions and external stimuli of investment, on one side, and farm prices

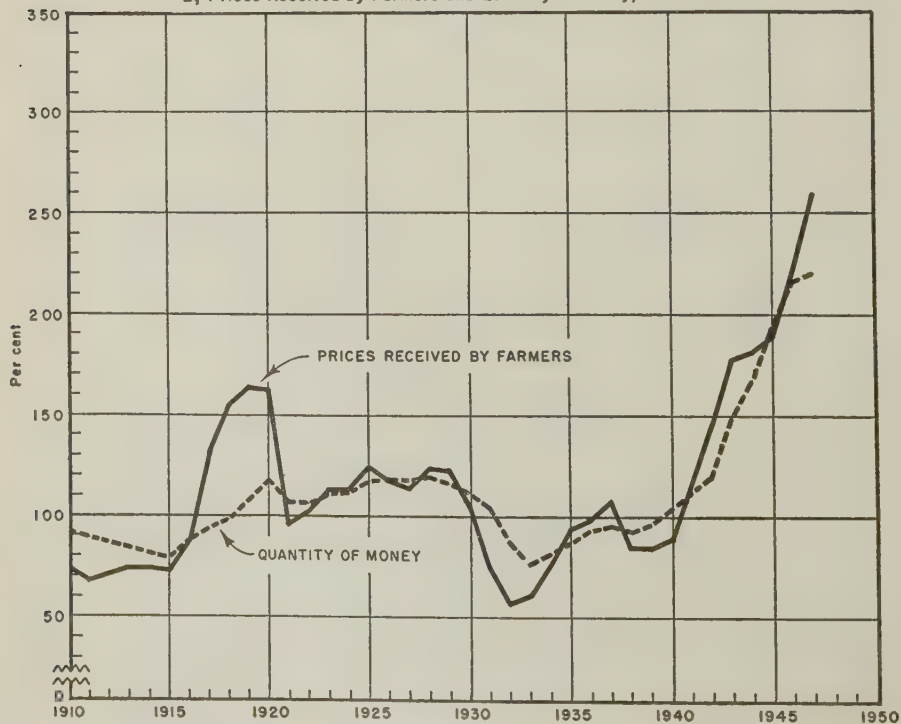
<sup>38</sup> Total deposits (that is, time deposits plus demand deposits adjusted for interbank and United States government deposits less cash items in the process of collection) plus currency is a more significant indicator of the quantity of money than demand deposits plus currency, because time and demand deposits are substitutes for many important purposes; furthermore, statistical differentiation between demand and time deposits has not always been uniform.

FIG. 23. INVESTMENT, QUANTITY OF MONEY, AND PRICES RECEIVED BY FARMERS,  
UNITED STATES (TREND = 100)

A, Investment and Quantity of Money, United States



B, Prices Received by Farmers and Quantity of Money, United States





and incomes, on the other, will public measures be most effective in reducing the extremes of economic fluctuations? And how can an understanding of these relations help a farmer adjust his program to cushion the effects of economic fluctuations on his business? An attempt will be made to answer these questions in the following section.

## 9. CONCLUSION: SOME IMPLICATIONS FOR PUBLIC ECONOMIC POLICIES AND FOR INDIVIDUAL ACTION

**Agricultural Programs and Anticyclical Policies.** Traditionally, the concern of farmers is more with agricultural programs than with policies directed toward stability of investment and nonagricultural income. The preceding sections tried to show that farmers, in California as elsewhere, have a real stake in the latter problem. The economic position of farmers, as a whole, is influenced more by fluctuations of investment and nonagricultural income than by parity-price legislation, agricultural production controls, agricultural tariffs, an ever-normal granary, or by other more narrowly agricultural policies to which farmers and their political and academic representatives are giving much attention.

Concern for their own economic position is not the only reason why farmers have a stake in economic stability. Farmers want to play their part as good citizens in maintaining social institutions that guarantee a maximum of individual freedom and opportunity for all. Economic instability is an important threat which endangers such institutions. The progress in organization and political influence which farmers have made during the last decade imposes upon them the responsibility to look beyond their line fences toward the welfare of the commonwealth.

**Public versus Private Investment Decisions.** It was shown that an increasing rate of investment, to balance (in the sense explained in section 7) an increasing rate of saving,<sup>80</sup> is the crucial problem of economic stability in a modern dynamic society. We also observed that, in the past, investment was partly private and partly public, with the latter share increasing. This pattern will be assumed here to continue also in the future.

Division of the power over investment decisions between private enterprise and the public is not the only possible assumption. Solutions of problems created by unbalance of saving and investment would be facilitated if all investment decisions were made by the public. However, the problems of long-run efficiency of an economic system are different from those of its cyclical stability. From the strictly economic standpoint, a socialized economy is probably superior only in solving the latter problems. Moreover, from the standpoint of maintaining free social institutions (in the above sense), division of power over investment decisions between private and various (federal, state, local) public interests appears as an essential safeguard, against both private monopolies and a totalitarian state.

Under the assumption of such a "mixed" economy, then, we may consider internal conditions and external stimuli of private investment and some public economic policies relating to them. Let us start with internal conditions.

<sup>80</sup> In the sense of annual amount of income saved, not annual proportion of income saved.

**Price Structure.** At present (spring, 1947), a considerable distortion exists in the price structure. Agricultural prices, the flexible portion of raw-materials prices in general (including lumber, paint, and other materials used in construction), and industrial wage rates are considerably higher than their long-time trend relation to other prices, especially those of durable goods, and of raw materials characterized by rigid prices (for example, steel, fertilizer). Some distortion of this kind is quite normal at the height of an upswing (section 4). However, this distortion is greater now than in 1920 and 1929. At the 1920 turning point of investment fluctuations, the worsening of internal conditions for investment was partly due to the rise of interest rates. At present, interest rates are tightening but are still low.<sup>40</sup> However, the existing distortions just referred to, the satisfaction of deferred demand for nondurable consumer goods, and the completion of the process of filling up inventories, will eventually bring about a decrease of investment, income, and prices similar to that in 1920-1921.

**Inflationary Tendencies.** Until this occurs, dangers threaten from the opposite direction—that is, from an excess of investment over its equilibrium rate and from resulting inflationary tendencies (section 7). These dangers are not discussed here in detail because they may have passed when these lines reach the reader. The reasons for this hope are: (1) A balanced federal budget or even a small budget surplus has removed the most important factor responsible for inflationary potentialities. (2) The recent survey of liquid assets, previously mentioned, has shown that a too abrupt liquidation need not be feared. (3) Production is at last getting into full swing in spite of social friction and technical bottlenecks. (4) Inventories are being filled. (5) The increase of prices after removal of O.P.A. already reflects a part of the postwar decrease in current and accumulated saving. However, political developments requiring increased public investment for foreign aid and for the military establishment may offset these favorable factors.

Even if a temporary decrease of private investment occurs, a quick and decisive revival and a check of price decreases—similar to that between 1921 and 1929—appears possible. The main reason for such a possibility is the existence of external stimuli for private investment which, as explained below, will probably remain rather strong during the first post-World War II decade even after the deferred demand for nondurable consumer goods and inventory repletion has been met.

**Two Questionable Public Policies.** Two public policies may impede the correction of the existing distortion of price relations during a temporary recession of private investment. For the time being, the result may not seriously interfere with a revival but may be of importance for a severe depression of private investment later on.

First, many raw materials are of agricultural origin. Through parity legislation the prices of agricultural products are tied to the more rigid (see section 4, especially figures 14 to 19) prices of commodities farmers buy. Technically and politically, parity prices (or income) for agriculture have

<sup>40</sup> Public policies are in favor of "cheap money" in order to facilitate public borrowing, and to ease the public interest burden. Official support of the market for federal bonds makes the latter virtual substitutes for money instruments. Quantitatively, private holdings of federal securities loom large in relation to money in the narrower sense.

become generally accepted. Continuation of these policies in some form may be expected after present government commitments have expired on December 31, 1948.

Second, leaders of labor unions—whose decisions have become one of the most important factors in the economic life of the nation—some government officials, and some academic economists are apparently in favor of a policy of maintaining and of possibly increasing wages during depressions “to maintain purchasing power”—besides pushing wage increases during prosperity under the “ability-to-pay” and “cost-of-living” principles.

There are several economically unsound aspects of the parity-price concept with which we are not concerned here—for example, the historical base, the disregard for secular changes in technology and consumption patterns, and, accordingly, the undesirable effects upon resource use and income distribution. We can only consider those aspects of parity which have to do with economic stability.

If parity prices are obtained through production controls to maintain agricultural prices (not through payments by the federal treasury), such controls interfere with what we called the automatic changes of internal conditions in the course of investment fluctuations (section 8). During the upswing, farmers reap the advantages of flexible prices (section 4). It is human nature that these advantages are quickly forgotten during the downswing. Farmers want to obtain through the parity device the advantages of rigid as well as flexible prices. This attempt has the effect of preventing the improvement of internal conditions for investment, which otherwise would take place during the downswing through decrease of raw-material prices, food costs, and wage demands.

Wage rates have maintained for a long time a strong upward trend. The sound economic basis for this trend is the increase in labor productivity. Historically, demand for labor during prosperity has forced expression of increases in labor productivity through wage increases rather than through price decreases. In recent decades, union policy and monopolistic elements in industry have accentuated this historical tendency. During depressions, average labor productivity decreases because of decreases in the volume of business. At such times, wage increases discourage employment in the investment-goods industries further. The effect on income and prices may be greater than that of wage increases on the purchasing power for consumption goods.

The question may be raised how serious the worsening of internal conditions through the two policies are at the present time. Although the elasticity of demand for raw materials and labor for investment is generally not great, it probably changes in the course of economic fluctuations (section 8). This elasticity is probably not negligible when external stimuli for investment are weak. As long as external stimuli remain strong, as can be expected during the next decade, private investment may revive even if a temporary recession does not fully correct the existing distortion in price relations. However, under these conditions, the eventual decrease in investment and prices will be severe when external stimuli weaken.

**Subsidies to Consumption or to Investment?** Another relation between the two policies and economic stability is of greater theoretical and practical significance.



If parity prices (or income) are obtained through payments by the federal treasury (not through programs to maintain agricultural prices), the effects just discussed need not occur. Nevertheless, the relation between parity payments and economic stability remains important. At first sight a subsidy to agricultural income during a depression may appear desirable to stabilize or to increase the total income stream of the economy. What is the validity of such an argument?

Agricultural production, as we know (section 3), is rather stable. A subsidy to agricultural income therefore, is largely a subsidy to consumption, saving, and land values rather than to investment. After a prolonged depression, deferred replacement and maintenance needs accumulate in agriculture, as in other industries. Under these conditions, a subsidy to agriculture may become a subsidy to investment. This is not true in the beginning of a depression—the time when public anticyclical policies should be applied. Furthermore, such policies cannot be confined to assistance in filling replacement and maintenance needs. Usually, new investment outlets must be created.

To subsidize saving is, on the basis of our previous discussion, abortive from the standpoint of stabilizing a decreasing income stream. To subsidize consumption is a relatively (compared with a subsidy to investment) ineffective way to increase the income stream.<sup>4</sup> This is as true for parity payments or other subsidies in agriculture as for wage increases (greater than warranted by increased labor productivity) in industry. The reason was already mentioned (section 7): because of the large total value of consumption (relative to investment), a practically conceivable subsidy, let us say of four billion dollars per year, would be a rather modest percentage increase of consumption, and consequently would lead to small, if any, secondary effects (section 7) upon employment, investment, and consumption.

A four-billion-dollar addition to consumption would amount to less than 10 per cent of consumers' expenditures for goods and services during the depth of the "great" depression 1932–33, and less than 5 per cent during recent years. Year-to-year and even seasonal fluctuations of consumer expenditures of these magnitudes are common. An addition of this magnitude would require little additional employment and investment in the consumption-goods industries and certainly none in the investment-goods industries.

In the short run, furthermore, the "leakage" into saving from income subsidies must be considered; as we know, the proportion of income saved tends to increase with increasing incomes, especially in the beginning of income increases (section 7).

On the other hand, if the same amount of subsidies were used to increase investment, the stimulus would be very great, and would lead to large secondary effects upon employment, investment, and consumption. Such subsidies could be made either directly through a public-works program or indirectly through public assistance to private construction in the fashion of the F.H.A.

A four-billion-dollar addition to investment would amount to approximately twice the total private construction expenditure (residential and industrial) in the depression years from 1932 to 1935; it would amount to

<sup>4</sup> We are considering here consumption subsidies to increase the total income stream. Consumption subsidies to raise nutritional standards—for example, through a food stamp plan, through school lunches, soup kitchens—are economically and socially desirable.

approximately half of private construction during the prosperity years from 1927 to 1929 (during recent years private construction was at depression levels because of wartime restrictions). An addition of this magnitude would not only be a great stimulus to employment and investment in construction but also would require additional employment and investment in industries producing machinery, tools, and raw materials for construction.

As was already pointed out (section 7), investment has a double aspect: it increases the income stream, and usually (but not necessarily) it increases productivity. The latter aspect, which is frequently forgotten when income-creating policies are discussed, is another reason why subsidies to investment are generally more desirable than subsidies to consumption.

**The Future of Investment.** The problem just considered, of whether public economic policies can influence the income stream most effectively through aiding consumption or investment, leads to the question whether there will be any need for public aid to investment, and, if so, what form it should take.

Whether in secular perspective, private investment will or will not keep up a balance with saving is partly a matter of the general institutional and political climate under which private enterprise has to operate. This climate now is not as favorable as in the beginning of the 1920's, and the future is somewhat cloudy.<sup>42</sup> If private initiative is curtailed for political and institutional reasons, the government must take over a larger share of investment decisions. Regardless of whether one wishes or fears such a development, one cannot dispose of it simply by reference to the "refusal" of private enterprise to take risks, or to the "insufficiency" of investment opportunities.

**In Secular Perspective.** A secular forecast of external stimuli for investment contains no small speculative element. Although private gross capital formation did not exhibit a strong upward trend during the last two decades (fig. 19), it has not been convincingly demonstrated that the pace of technological change, of the discovery of new resources, and of the opening of new markets, has slackened. To be sure, in some parts of the world, particularly western Europe, the United States, and possibly Japan, the rate of population growth has decreased (even here the evidence is not easily interpreted). However, other areas, notably eastern Europe, Russia, and parts of South America, are still in the midst of the great increase in the rate of population growth which takes place in the earlier stages of industrialization. Other parts of the world, especially China, India, Indonesia, and parts of South America, have not yet experienced the full impact of industrialization.

The relation between population growth and investment is by no means simple. After a certain population density is reached in a given country, the growth of real income per person is more important for stimulating and absorbing investment than population growth. As a corollary, it is possible to have, temporarily at least, a rapid growth of population without rapid growth of investment because savings are hoarded and because industrial and managerial skills are scarce. The result is a stationary (if agricultural production can be expanded) or decreasing real income per person and ultimately a reassertion of the Malthusian law. Examples are found in colonial and semi-

<sup>42</sup> This broad but important factor cannot be treated in detail within the space allotted to this study. The reader is referred to Schumpeter (1942). For proper balance, the excellent review article by Hardy (1945) should be read in conjunction with this book.

colonial areas where mortality in early childhood has been reduced through the influence of western science. In general, changes of population growth must be regarded as a dependent rather than an independent variable in changes of technology and investment. This is true not only for secular changes in population growth just considered, but also for cyclical changes of population growth—which are of rather small amplitude (Ciriacy-Wantrup, 1936, 1938a, 1938b).

**In the Intermediate Future.** Whatever one's opinion may be with respect to the secular prospect for external investment stimuli, for the intermediate future—let us say the next decade—one does not need to be pessimistic. Let us assume for our appraisal that it will be possible to maintain peace for the next decade—at least a peace of that precarious nature that prevailed between 1933 and 1939.

At home, war-deferred needs of consumer durable goods, especially houses, can scarcely be satisfied in less than a decade. Estimates of the country's housing need range between eleven and sixteen million units. New home construction is at present at an annual rate of about one million units. Deferred maintenance of industrial plants and equipment will likewise require several years. In addition, the war has greatly accelerated technological obsolescence in existing industries, has given great impetus to new industries (in the fields of aviation, light metals, synthetic rubber, synthetic fibers, plastics, wood products, radar, and radio) and has laid the foundation for other industries still in the initial stages of development but with the promise of great future importance (in the fields of jet propulsion, rockets, synthetic fuels, and atomic energy). Furthermore, it should not be forgotten that the relatively small volume of private gross capital formation during the pre-World War II decade will have some importance for future investment needs. This situation is quite different from that which prevailed after World War I. Already, capacity in some basic investment-goods industries—for example, steel—is regarded by some as insufficient.

Abroad, the war has not only created a backlog of demand for durable goods and accelerated the pace of technological change but, in contrast to the United States, has destroyed durable goods on a large scale. More importantly, and this is quite different from World War I, important durable-goods industries themselves have been destroyed during the war, or their productivity is being paralyzed through "peace" policies, especially in Germany and Japan. Political changes and the experience that only industrial countries can hope to fight a modern war successfully, and to raise standards of living appreciably in peace, have increased the demand for industrialization all over the world.

Some of these investment stimuli—for example, those connected with capital exports and atomic energy—will require public participation. There are others which primarily stimulate public investment, but which have considerable secondary effects upon private investment. Among them, one may mention slum clearance, superhighways, resource conservation and development, greater social services in the fields of health, nutrition, recreation, education, old-age security, and, most importantly, a much larger peacetime military establishment. With respect to the latter, as has already been indi-



cated, the future will probably have greater similarity with the situation prevailing between 1933 and 1939 than with the 1920's.

**The Need for Public Policy.** Existence of these and other investment stimuli does not assure that investment will increase at a stable rate. On the contrary, it can be expected that private investment in the future will be no less erratic than in the past (fig. 19, p. 48). There are two reasons for such an expectation: The first reason is the present great boom in private investment. The abnormal concentration of private demand for durable goods during the post-war period will in itself generate fluctuations of this demand in the future. Second, because of the political implications of some important external stimuli and because of changes in the institutional climate already emphasized, private investment will probably be rather sensitive (if not "nervous") with respect to political changes at home and abroad. Under these conditions public economic policies to stabilize the flow of investment appear necessary.

**The Goal of Public Policies.** The goal of public policies can scarcely be avoidance of investment fluctuations altogether. Such a goal would not only be overambitious, but dangerous. It would require positive anticipating actions, which, in view of the great uncertainties surrounding any forecast of private investment, would almost certainly lead to serious mistakes. An illustration of such mistakes is found in the experience with public policies put into effect to avoid the depression which many economists and government officials expected right after the end of World War II. The political implications of anti-cyclical economic policies are great. There is a temptation to make forecasts fit (consciously or unconsciously) into a political pattern that appeals to the forecaster. This danger becomes the greater the more ambitious the goal set for public policies.

The danger just indicated is not reduced through the use of "economic models" for forecasting, a use which has become rather popular since World War II. Such models mean merely that a hypothesis is spelled out in quantitative terms. Many users of these models forget that the essential problems are soundness and verification rather than the mere quantitative restatement of the hypothesis. Such quantitative restatement may lead to dangerous simplifications, omissions, and distortions by those who are mainly interested in the deceiving appearance of security that figures give, rather than in the soundness of the underlying hypothesis. Unfortunately, a shining quantitative model is better suited to sway public opinion or to cover up nonscientific motives than a clear and detailed statement of the hypothesis.

**Fiscal and Monetary Policies.** During the boom of private investment, the following modest and negative but practical and safe goals of public policy may be set:

1. Deferment of the greatest possible amount of public capital expenditures. However, not all public capital expenditures are deferrable. National security and public health and safety would seem more important than economic stability. Other capital expenditures—for example, dam construction—cannot be discontinued for technical reasons after having been started.

2. Increase of public revenues through keeping tax rates as high as feasible without decreasing incentives to individual effort. This is especially true for pay-as-you-go taxes (personal income, payroll, sales, and turnover taxes). In

the interest of ease and speed of rate adjustment, the problem of progressiveness of taxes should not be tied up with that of anticyclical effects of taxes.

3. Cessation of public borrowing, increase of liquid reserves, and, under certain conditions, increased amortization of the public debt. The advisability of increased debt amortization depends on the type of debt (short-term, long-term) and of the holder (banks, institutions other than banks, corporations, and individuals).

4. Prohibition or restriction of a large flow of credit into the purely speculative markets (stock and commodity markets, real estate). Such a flow was partly responsible for the excesses and the sharp reaction in 1929. Generally, however, not too much should be expected from this measure in dampening a boom.

All these measures may be characterized as economic preparedness for a depression. Besides, they help to avoid the excesses of a boom. They do not commit the government to take positive, anticipating action to prevent a depression.

If the fiscal measures suggested under the first three points are employed sufficiently early and resolutely, it may not be necessary to tighten credit conditions through more strictly monetary measures (changing reserve requirements and discount rates, open market operations, and so on). Frequently, however, fiscal action must be supported by monetary action when "full" employment is approached. As unemployment approaches a low level, greater and greater increases of income and prices are necessary to absorb an additional amount of unemployment. This situation requires close watching by fiscal and monetary authorities. It is an oversimplification if "full" employment is stated in one numerical term. The problem is essentially one as to how much increase in prices should be tolerated to decrease unemployment.

In the beginning of a decline of private investment, some general relief in tax rates may be given. Main reliance, however, would probably have to be placed on public capital expenditures and, at least after internal conditions for investment have become more favorable, on public assistance to private investment through loan guarantees, specific tax concessions, and direct subsidies. These activities make budget deficits and, if reserve funds are exhausted, an increase of the public debt unavoidable.

**Public Debt.** How far an increase of the public debt is not only of cyclical but also of secular nature—that is, not offset by debt reduction during prosperity—depends on the measures of economic preparedness suggested for the period of prosperity and on the problems of secular growth of private investment already referred to. An anticyclical economic policy properly designed with respect to timing and volume of taxation and borrowing does not necessarily involve a rapid secular growth of the public debt. On the other hand, before becoming alarmed about a secular increase of the public debt and its results upon the income distribution, one must compare the increase in the interest burden with the increase of the national income (including collective items such as free education, medical care, recreation, and transportation) and changes of indebtedness in the public sector of the economy with those in the private sector. As long as the public debt is an internal debt—not owed to foreign countries—there is little reason for alarm as long as the interest

burden does not increase faster than the national income and a "rentier class" does not become too large, too fixed, and politically too powerful. The last danger appears rather small in a democracy, provided proper attention to this problem is given in the methods of taxation and borrowing.

**Type of Public-Investment Outlets.** There are two aspects of properly designed and executed fiscal policies which are of special interest to agriculture—aside from the farmer's interest in greater stability of the whole economy. These aspects are connected with the type of public-investment outlets and the type of taxes which fit best into such policies.

**Conservation Policy.** It is the aggregate of public *and* private investment that counts. Hence, public investment should choose outlets that will make it complementary to and not competitive with private investment. Investment outlets which satisfy this condition are largely in fields where returns are collective or are extra-market goods and services. One such field of special interest to farmers is the conservation of natural resources, especially of soil and water. Public expenditures for conservation can well be integrated into an anticyclical fiscal policy; furthermore, the economic possibilities of private expenditures for conservation are increased by greater economic stability (Ciriacy-Wantrup, 1946).

**Taxation Policy.** It was shown in section 4 that the rigidity of real estate taxes is an important cause for the worsened economic position of farmers during depressions. For the American farmer, real estate taxes in the form of the general property tax are more significant than any other type of taxes. In the United States, for instance, it is estimated (1927) that 83.8 per cent of all federal, state, and local taxes paid by agriculture were general property taxes (Coombs, 1930). During the depression years in the thirties this percentage was probably even higher. During the recent war years it was lower.

On the other hand, it was just pointed out that an anticyclical fiscal policy requires flexibility of taxes and main reliance on pay-as-you-go taxes. A shift in emphasis from the property tax to income and sales taxes with rate adjustment during prosperity and depression would generally be to the advantage of farmers (Ciriacy-Wantrup, 1944).

There are some institutional obstacles to overcome in making the proposed shift in taxation. Support of local governments (counties, cities, special districts, in some cases, states) depends upon the general property tax. Administratively it would be a great economy to levy local taxes as a percentage of federal income taxes; from the standpoint of over-all tax economy it would thus become worth while to refine administration of the latter to a very high degree. Such a tax reform—which, of course, could be brought about only gradually—would result in greater fluctuations of local tax receipts. As we know, it would be highly undesirable to balance the decrease of the tax base during economic depressions through increases in tax rates. One remedy would be to use reserve funds already mentioned to stabilize revenues available to local governments for expenditure. Another would be to facilitate borrowing and debt retirement by local governments during economic fluctuations. In this way local governments could effectively supplement federal anticyclical fiscal policies. Both remedies require new social institutions which can scarcely come into existence and effective operation without federal assistance.



Farmers and their political representatives can help a great deal to bring such reforms closer to realization.

**What the Farmer Can Do Himself.** Finally, we may consider briefly some measures which the individual farmer himself may undertake, to guard against the effects of economic fluctuations. The goal for such private measures is not unlike the goal set above for public policies: the best defense against the effects of a depression is economic preparedness during prosperity. What does such economic preparedness mean for the individual farmer?

1. He should keep himself well informed about the national outlook for non-agricultural business activity. Such information should receive prominent attention in the reports of public and semipublic agencies which supply outlook material.

2. During prosperity the farmer should attempt to decrease fixed charges (section 4). The problem of taxes has already been considered. There remains the problem of the interest burden. The increase of net income during the upswing should be used first for decreasing long-term debts. No new long-term debts should be contracted.

3. Income disposable after elimination of long-term debts may at least in part be accumulated as liquid reserves in United States saving bonds or similarly safe and stable securities. What percentage of disposable income is saved in this form is determined by the advisability of investment (see the next three points) and by the income tax. It is well known that, for purposes of the income tax, farmers have some legitimate opportunities to charge investment to current expenses. Frequently this may be more advisable than saving because of the resulting lowering of income taxes.

4. The timing of saving and investment deserves consideration. Land should be purchased in the beginning of the upswing before land values have materially increased. After land values have increased, disposable income is better accumulated in liquid reserves. During the depression such reserves may be profitably used for buying land at lower prices. The same timing is not advisable for the purchase of equipment. Prices of farm machinery are rather rigid during economic fluctuations (section 4). It is usually profitable to invest in farm machinery during prosperity in order to decrease hired labor costs. Farm wage rates are rather flexible during economic fluctuations (p. 25).

5. The investments that should receive priority during prosperity are those that decrease recurrent cash expenditures. Such a decrease helps greatly in weathering the depression. For example, a farmer who rents some of his acreage may well purchase land (but see the preceding paragraph) provided he has cash available, and does not merely exchange the obligation to pay rent against the usually more rigid obligation to pay interest. The same is true for improvements in buildings and equipment to reduce costs of hired labor and of upkeep.

6. During prosperity, particular attention should be given to the problem of soil depletion. The fertilizer budget should be expanded. As we know (section 4), fertilizer prices belong to the rigid portion of the price structure. The farmer should take advantage of this during the upswing. Other soil-conservation measures requiring cash expenditures should likewise be under-

taken during prosperity. In principle, this point aims at the same end as the preceding one. But the importance of maintaining and, if possible, increasing soil productivity during prosperity is so great that special emphasis appears justified.

Without fixed-interest charges, with liquid reserves, with efficient equipment, and with well-maintained soil productivity, the farmer's economic position in entering a depressing is much stronger than that of other classes of the population—for example, industrial workers, most business men, and dividend recipients. The farmer need not fear unemployment (section 3). His real income from home-produced food and shelter remains unimpaired. To be sure, prices received will decline relative to prices paid (section 4). But if the suggested measures of economic preparedness were taken during prosperity, the farmer can reduce cash expenditures for a considerable period of time without too great a decrease of productivity. This is particularly true for the family farmer.

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We may conclude, therefore, that under proper anticyclical public policies and proper private measures of preparedness, economic fluctuations are no valid reason why farmers should become special wards of the government. Farm-relief measures in existence or proposed by agricultural economists, such as parity legislation and various forms of general subsidies—that is, subsidies not aimed at specific social objectives such as resource conservation, better nutrition, and specific adjustments of production—are a superficial, and in the long run, ineffective attack upon some symptoms of economic fluctuations. Such policies deflect the attention of farmers and of the public from those general anticyclical public policies and those private measures of economic preparedness which are able to take most of the danger—to individual farmers and to social institutions—out of economic fluctuations.

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## SOURCES OF DATA FOR FIGURES AND TABULATIONS

### Fig. 1.: United States cash farm income:

1910-1923: U. S. Department of Agriculture. *Agricultural Statistics, 1942*, p. 660.

1924-1942: U. S. Bureau of Agricultural Economics. *Cash Receipts from Farming by States and Commodities, Calendar Years, 1924-44*, p. 158-60. Washington, D.C., 1946. Processed.

1943-1946: U. S. Bureau of Agricultural Economics. *Farm Income Situation*, FIS-75, p. 11-13, Apr., 1946; FIS-78, p. 1, 3, July, 1946; FIS-85, p. 5, Feb., 1947. Processed.

California cash farm income: Same as above except:

1910-1923: Adjusted unpublished data of the U. S. Bureau of Agricultural Economics, Berkeley, California. The adjustment was due to using data of the California State Chamber of Commerce. *Economic Survey Series, 1942-43*, Report No. 3. Processed, for the fruits and nuts, and for the vegetables series from 1910-1923 and 1910-1917 respectively. The adjusted series was linked with the series from *Cash Receipts from Farming* on the basis of 1924-1929.

### Fig. 2.: United States farm population:

1910-1945: U. S. Bureau of Agricultural Economics. *Population Estimates, 1900-1945*, p. 1-3. Washington, D.C., 1945. Processed.

California farm population:

1910: U. S. Department of Agriculture. *Agricultural Statistics, 1942*, p. 646. This figure applies to January 1 as estimated by the Bureau of the Census based on the number of farms in 1910, the average farm population per farm in 1920, and the change in the number of persons per family in the rural population between 1910 and 1920.

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### Fig. 3.:

A, Livestock and livestock products: Same as figure 1.

B, Fruits and nuts: Same as figure 1 and the following: U. S. Bureau of Agricultural Economics. *Net Farm Income and Parity Report*, p. 19. Washington, D.C., 1944. Processed. U. S. Bureau of Agricultural Economics. *Farm Income Situation*, FIS-84, p. 3, Jan., 1947. Processed.

C, Major field crops:

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*Income from Oats and Barley, Calendar Years 1910-38*, p. 15, 89; *Section 15—Income from Rice, Calendar Years 1910-40*, p. 9; *Section 16—Income from Hay, Calendar Years 1910-41*, p. 8. Washington, D.C., 1938-1942. Processed.

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D, Vegetables, United States cash farm income:

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Fig. 4.: Same as figure 3.

Fig. 5.: Same as figure 1 and the following:

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Fig. 6.: Same as figures 1 and 5.

Fig. 7.:

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Fig. 8.: Same as figure 7 and the following:

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Fig. 9.: Same as figure 8.

Fig. 10.:

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- 1941-1944: U. S. Bureau of Agricultural Economics. *Agricultural Finance Review*, vol. 8, p. 87. Nov., 1945. Processed.
- 1945: U. S. Bureau of Agricultural Economics. *Agricultural Finance Review*, vol. 8, p. 87. Nov., 1945. Processed.
- 1946: U. S. Bureau of Agricultural Economics. *Agricultural Finance Review*, vol. 9, p. 97. Nov., 1946. Processed.

## Fig. 11.:

## Value:

- 1895-1899: U. S. Department of Agriculture. *Yearbook, 1910*, p. 674.
- 1900-1909: U. S. Department of Agriculture. *Agricultural Statistics, 1941*, p. 481.
- 1910-1945: U. S. Department of Agriculture. *Agricultural Statistics, 1942*, p. 537.
- And U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products*, Apr., 1946, p. 8, and Dec., 1946, p. 8. Processed.

## Quantity:

- 1895-1914: U. S. Foreign Agricultural Service. *Foreign Crops and Markets*, vol. 31, no. 9, p. 263-64. Aug. 26, 1935. Processed.
- 1915-1939: U. S. Department of Agriculture. *Agricultural Statistics, 1942*, p. 540.
- 1940: U. S. Bureau of the Census. *Statistical Abstract of the United States, 1944-45*, p. 655.
- 1941-1944: U. S. Office of Foreign Agricultural Relations. *Foreign Crops and Markets*, Annual supplement, Aug. 31, 1945, p. 5. Processed.
- 1945: U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products, Fiscal Year 1945-46*, p. 17. Processed.

## Fig. 12.: Same as figure 11, except:

## Pork and pork products:

- 1895-1899: Richards, Preston. *Trends in Production and Foreign Trade for Meats and Livestock in the United States*, p. 52. Washington, Gov't Print. Off., (U. S. Dept. Agr. Tech. Bul. 764).
- 1900-1909: U. S. Department of Agriculture. *Yearbook, 1923*, p. 1113.
- 1910-1914: U. S. Department of Agriculture. *Yearbook, 1927*, p. 1107.
- 1915-1939: U. S. Department of Agriculture. *Agricultural Statistics, 1942*, p. 543.
- 1940-1944: U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products*, Apr., 1946, p. 7-10. Processed.
- 1945: U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products, Fiscal Year 1945-46*, p. 17. Processed.

## Fig. 13.: Same as figure 11.

## Fig. 14.: Same as figure 11 and the following:

- 1910-1934: U. S. Department of Agriculture. *Agricultural Statistics, 1937*, p. 366.
- 1935-1944: U. S. Department of Agriculture. *Agricultural Statistics, 1946*, p. 439.
- 1945: U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products, 1945-46*, p. 8. Processed.

## Fig. 15.: Same as figures 1, 5, and 11, and the following:

- 1910-1945: U. S. Bureau of Agricultural Economics. *Agricultural Statistics, 1945*, p. 441.



1946: U. S. Bureau of the Census. *Urban and Rural Population of the United States, by Age and Sex: 1946, 1945, and 1940*, p. 3. Washington, D.C., 1947. Processed. (P-S, No. 19.)

Fig. 16.: U. S. Bureau of Agricultural Economics. *Agricultural Outlook Charts*, 1947, p. 85, 94, and 103. Washington, D.C., 1946. Processed. And: U. S. Bureau of Agricultural Economics. *Consumption of Agricultural Products*, by Elna Anderson, p. 10. Washington, D.C., 1941. Processed. And: U. S. Agricultural Marketing Service. *Farm Production, Disposition, and Income from Milk, 1924-1940, by States*, p. 28. Washington, D.C., 1941. Processed.

Fig. 17.: Prices received by farmers: Same as figure 5.

Income of industrial workers:

1910-1945: U. S. Bureau of Agricultural Economics. *Agricultural Outlook Charts*, 1946, p. 2. Washington, D.C., 1945. Processed.

1946-1947: U. S. Bureau of Agricultural Economics. *Agricultural Situation*, vol. 31, no. 9, p. 14. Sept., 1947.

Income of nonfarm population:

1910-1928: U. S. Department of Agriculture. *Agricultural Statistics*, 1942, p. 663.

1929-1941: U. S. Department of Agriculture. *Agricultural Statistics*, 1945, p. 441.

1942-1946: U. S. Bureau of Agricultural Economics. *Farm Income Situation, FIS-89, June-July, 1947*, p. 21. Processed.

1943-1946: U. S. Department of Commerce. *Survey of Current Business*, vol. 24, no. 4; vol. 27, no. 5, Apr., 1944-May, 1947.

1947: Estimated by obtaining the ratio between U. S. Department of Agriculture figures and the U. S. Department of Commerce figures for the years 1943-1946.

Fig. 18.:

Old series:

1910-1944: U. S. Bureau of Foreign and Domestic Commerce. *Gross National Product or Expenditure, 1909-1944*, 1 p. Washington, D.C., 1946. Processed.

1945-1946: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 33, no. 2, p. 206. Feb., 1947.

New series:

1929-1946: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 33, no. 9, p. 1109. Sept., 1947.

Fig. 19.:

Old series:

1910-1944: U. S. Bureau of Foreign and Domestic Commerce. *Gross National Product or Expenditure, 1909-1944*, 1 p. Washington, D. C., 1946. Processed. And: Government Statistics Bureau. *Handbook of Basic Economic Statistics*. 1947 Edition, p. 4-5. Washington, D.C., 1947. Processed.

1945-1946: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 33, no. 2, p. 206. Feb., 1947.

New series:

1929-1946: U. S. Bureau of Foreign and Domestic Commerce. *National Income*, Supplement to Survey of Current Business, p. 19. July, 1947. Second printing. Washington, Gov't Print. Off., 1947.

1947: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 33, no. 9, p. 1167, 1168. Sept., 1947.

The old and new series were linked on the basis of 1929-1939.

Fig. 20.: Same as figures 5, 17, and 19.

Fig. 21.:

Durable manufactures:

1919-1945: U. S. Office of Price Administration. *OPA Handbook of Basic Economic Data*. 2d ed., p. 72-73. Washington, D.C., 1946. Processed.

1946: Computed from an average of monthly figures in Government Statistics Bureau. *Handbook of Basic Economic Statistics*. 1947 Edition, p. 78, 79. Washington, D.C., 1947. And its *Monthly Supplement*, no. 2, p. 13. Feb., 1947. Processed.

Farm machinery:

1910-1945: U. S. Bureau of Agricultural Economics. *Agricultural Prices*, p. 33-34. Apr. 29, 1946. Processed.

1946: U. S. Bureau of Agricultural Economics. *Farm Cost Situation*, FCS-2, p. 1. Mar., 1947. Processed.

Fig. 22.:

Interest rate of prime commercial paper:

1910-1941: U. S. Board of Governors of the Federal Reserve System. *Banking and Monetary Statistics*, p. 448. Washington, D.C., 1943.

1942-1943: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 30, no. 12, p. 1215. Dec., 1944.

1944-1946: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 32, no. 8, p. 901. Aug., 1946. The 1946 figure is preliminary, based on monthly figures from January to December, 1946.

Yield of corporate bonds: Standard and Poor's Corporation. *Standard and Poor's Trade and Securities Statistics, Long-term Security Price Index Record through December 31, 1940*.

1910-1939: vol. 96, no. 9, Sec. 2, p. 127. Sept., 1941. Standard and Poor's Corporation. *Standard and Poor's Trade and Securities Statistics, Current Statistics Combined with Basic Statistics*.

1940-1941: vol. 97, no. 1, Sec. 2, p. 8. Jan., 1942.

1942: vol. 97, no. 12, Sec. 1, p. 27. Dec., 1942. And: vol. 98, no. 1, Sec. 1, p. 27. Jan., 1943.

1943: vol. 99, no. 1, Sec. 1, p. 27. Jan., 1944.

1944: vol. 100, no. 1, Sec. 1, p. 27. Jan., 1945.

1945: vol. 12, no. 1, Sec. 1, p. 27. Jan., 1946.

1946: vol. 12, no. 8, Sec. 1, p. 27. Aug., 1946. The 1946 figure was obtained from Standard and Poor's *Current Statistics* and compared with *Current Statistics Combined with Basic Statistics*, vol. 31, no. 1, Sec. 1, p. 27. Jan., 1947.

Fig. 23.:

Investment: Same as figure 19.

Quantity of money:

1910-1936: U. S. Board of Governors of the Federal Reserve System. *Banking and Monetary Statistics*, p. 34-35. Washington, D.C., 1943.

1937-1945: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 32, no. 8, p. 891. Aug., 1946.

1946-1947: U. S. Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin*, vol. 33, no. 9, p. 1131. Sept., 1947.

Tabulation, page 9: Same as figure 1.

Tabulations, pages 15, 16: U. S. Bureau of Agricultural Economics. *Cash Receipts from Farming by States and Commodities, Calendar Years 1924-44*, p. 154, 158. Washington, D.C., 1946. Processed.

Tabulation, page 17:

Cash income from dry edible beans, potatoes, sweet potatoes, and total truck crops—same as above.

Total truck crops include the following: lettuce, cantaloupes, asparagus, tomatoes, green peas, celery, onions, cauliflower, artichokes, snap beans, watermelons, cabbage, cucumbers, lima beans, beets, carrots, sweet corn, eggplant, escarole, Honey Ball and Honey Dew melons, kale, green peppers, pimientos, and spinach.

Cash income from individual truck crops was computed in the following way: the total farm value for each truck crop was obtained from: U. S. Bureau of Agricultural



Economics. *Estimates of Acreage, Production and Value, 1918-1927 Under New Seasonal Groupings*. Washington, D.C., 1944. Various paging. Processed. *And: Revised Estimates of Acreage, Production and Value, 1928-1941, Under New Seasonal Groupings*. Washington, D.C., 1943. Various paging. Processed. *And: Commercial Truck Crops for Processing [1918-1927]*. Washington, D.C., 1945-1946. Various paging. Processed. *And: Truck Crops for Commercial Processing; Acreage, Production, Price and Value, 1928-1941*. Washington, D.C., 1944. 64 p. Processed. These values were adjusted on the basis of the ratios between cash farm income from truck crops and farm value of truck crops.

Tabulation, page 23: U. S. Bureau of Agricultural Economics. *Income Parity for Agriculture. Part VI—State Estimates of Income and Production Expenses. Section 1. Net Income and Production Expenses of Farm Operators by States, Calendar Years 1929, 1939-44*, p. 40-51. Washington, D.C., 1945. Processed.

Tabulation, page 24:

Cash farm income: Same as figure 1.

Value of domestic agricultural exports:

1910-1914: U. S. Department of Agriculture. *Agricultural Statistics, 1940*, p. 485. Converted from a July-June basis to a calendar year basis by straight-line interpolation.

1915-1944: U. S. Office of Foreign Agricultural Relations. *Foreign Crops and Markets, Calendar Year Supplement, Dec. 1, 1945*, p. 3. Processed.

1945: U. S. Office of Foreign Agricultural Relations. *Foreign Agricultural Trade, United States Foreign Trade in Agricultural Products, Mar., 1946*, p. 6. Processed.